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AN ARCHEOLOGICAL OVERVIEW AND MANAGEMENT PLAN FOR THE
ARMY MATERIALS AND MECHANICS RESEARCH CENTER(U)
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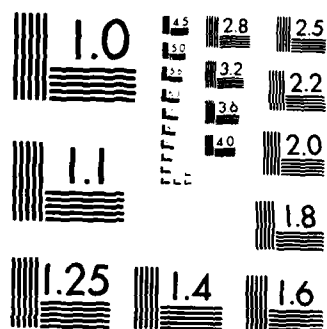
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**Final
Report No. 2**

August 1984

AD-A146 044

**An Archeological Overview and
Management Plan for the
Army Materials and Mechanics Research Center**

Under Contract CX4000-3-0018
with the

**National Park Service
U.S. Department of the Interior**
Philadelphia, Pennsylvania 19106

for the
U.S. Army Materiel Development and
Readiness Command

by
Envirosphere Company

2 World Trade Center
New York, New York 10048

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Prepared under the Supervision of

Joel I. Klein, Principal Investigator

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16. Abstract (Limit: 200 words) This archeological overview and management plan provides a tool which can be used by DARCOM and decision-makers at the Army Materials and Mechanics Research Center, to assist in complying with existing regulations and procedures relating to historic preservation. (Technical Manual 5-801-1, Technical Note No. 78-17, Resources Management; 32 CFR 650.18-650.193; Army Regulation 420-40; 36 CFR 800). This document summarizes data relating to the area's environmental history; cultural chronology; historic and modern ground disturbances; previous archeological surveys; presently identified archeological resources; known artifact, ecofact, and or documentary collections relating to archeological resources; potentially identifiable but not presently recorded archeological resources; significant archeological resources; ongoing and planned activities that could affect archeological resources; locational data of known archeological resources; and locational data of potential archeological resources. No significant archeological remains are known to be extant on AMMRC property. One prehistoric archeological site is reported to have existed on AMMRC property but is believed to have been destroyed by construction activities. Additional prehistoric archeological remains have been recovered in areas immediately adjacent to AMMRC and the possibility exists that previously unrecorded prehistoric remains may exist within undisturbed portions of AMMRC property. A literature review has indicated that at least 28 potential historic period archeological sites may exist at AMMRC. These fall into two broad categories: those associated with Watertown Arsenal and those associated with civilian occupation of the area prior to government ownership. The physical integrity of these sites is unknown. Only a few are believed to be potentially significant. Additional studies recommended include 1) gathering more data relating to non-extant arsenal-related structures; 2) an archeological survey of wooded and paved areas in the southeast portion of AMMRC and 3) an evaluation of the area south of North Beacon Street presently used for recreational purposes by the Metropolitan Park Commission.				
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MANAGEMENT SUMMARY

This archeological overview and management plan provides a tool which can be used by DARCOM and decision-makers at the Army Materials and Mechanics Research Center to assist in complying with existing regulations and procedures relating to historic presentation (Technical Manual 5-801-1, Technical Note No. 78-17, Resources Management; 32 CFR 650.18-650.193; Army Regulation 420-40; 36 CFR 800). This document summarizes data relating to the area's environmental history; cultural chronology; historic and modern ground disturbances; previous archeological surveys; presently identified archeological resources; known artifact, ecofact, and or documentary collections relating to archeological resources; potentially identifiable but not presently recorded archeological resources; significant archeological resources, ongoing and planned activities that could affect archeological resources; locational data of known archeological resources; and locational data of potential archeological resources.

No significant archeological remains are known to be extant on AMMRC property. One prehistoric archeological site is reported to have existed on AMMRC property but is believed to have been destroyed by construction activities. Additional prehistoric archeological remains have been recovered in areas immediately adjacent to AMMRC and the possibility exists that previously unrecorded prehistoric remains may exist within undisturbed portions of AMMRC property. A literature review has indicated that at least 28 potential historic period archeological sites may exist at AMMRC. These fall into two broad categories: those associated with Watertown Arsenal and those associated with civilian occupation of the area prior to government ownership. The physical integrity of these sites is unknown. Only a few are believed to be potentially significant.

Additional studies recommended include 1) gathering more data relating to non-extant arsenal-related structures 2) an archeological survey of wooded and paved areas in the southeast portion of AMMRC and 3) an evaluation of the area south of North Beacon Street presently used for recreational purposes by the Metropolitan Park Commission.

PREPARERS AND QUALIFICATIONS

Joel I. Klein is Project Manager for the DARCOM project and is the principal author of this Archeological Overview and Management Plan. He holds a BS in Anthropology and Physics and MA and PhD degrees in Anthropology, and is certified by the Society of Professional Archeologists in field research and cultural resource management. His 15 years of professional experience have been in anthropological and archeological research, and cultural resource management. He has participated in archeological investigations across the United States. He is presently a Principal Engineer with Envirosphere Company.

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Sydne B. Marshall is a contributing author. For the DARCOM project she functioned as Assistant Technical Manager, responsible for the day-to-day operation of the project. She holds BA, MA, M Phil, and PhD degrees in Anthropology. Over the past twelve years, Dr. Marshall has participated in the excavation, analysis, management, and reporting of many large and small archeological projects in northeastern North America. She is currently a Senior Engineer with Envirosphere Company.

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This archeological overview and management plan could not have been written without the cooperation of Don Diamond, Chief of AMMRC's Facilities Engineering Division; Sam Gilfix, AMMRC Master Planner; and Charlene Twigg. All gave generously of their time during several visits to AMMRC and provided essential data relating to the history of the installation's development.

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1.0 INTRODUCTION

1.1 PURPOSE AND NEED

This archeological overview and management plan will assist the U.S. Army Materiel Development and Readiness Command (DARCOM) in its efforts to comply with laws and regulations concerning the management of archeological resources at the Army Materiels and Mechanics Research Center (AMMRC).

The National Historic Preservation Act of 1966 as amended (94 Stat. 2988) affirmed the policy of the federal government (Sec. 2(3)) to "administer federally owned, administered or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations." Section 110(a)(1) of that code specifies that each federal agency is responsible for the preservation of such resources on agency-owned or controlled lands. DARCOM is committed to the implementation of that policy, following the guidelines for historic resource management set forth in the 1966 Act and related laws, regulations, and technical guidance.

DARCOM has contracted with the U.S. Department of the Interior's National Park Service to provide technical guidance for the development of DARCOM installation cultural resource overviews and management plans. The program is entitled the DARCOM Historical/Archeological Survey (DHAS). The National Park Service has in turn separated this review and planning program into two major elements, architectural and archeological. The architectural review and planning function is being directed by the Service's Historic American Buildings Survey (HABS), while the archeological resource assessment and planning function is being handled through the Service's Interagency Resource Management Division (IRMD). The archeological function includes both prehistoric and historical archeology.

Under the requirements of the National Historic Preservation Act (NHPA) of 1966 as amended (80 Stat. 915, 94 Stat. 2987; 16 USC 470), DARCOM must:

- inventory, evaluate, and where appropriate nominate to the National Register of Historic Places all archeological properties under agency ownership or control (Sec. 110(a)(2))

- prior to the approval of any ground-disturbing undertaking, take into account the project's effect on any National Register - listed or eligible property; afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed project (Sec. 106)
- complete an appropriate data recovery program on an eligible or listed National Register archeological site prior to its being heavily damaged or destroyed (Sec. 110(b), as reported by the House Committee on Interior and Insular Affairs [96th Congress, 2d Session, House Report No. 96-1457, p. 36-37])

Since the passage of the National Historic Preservation Act Amendments of 1980, DARCOM has begun a more active commandwide program in historic resource management. DARCOM's management program involves several steps. The first step is a literature review and preliminary evaluation of known cultural resources on DARCOM facilities. This provides a basis for predicting the overall resource base requiring management. The second step involves applying the understood parameters of the resource base in a plan which takes into consideration both short- and long-term command activities and goals.

Other compliance regulations taken into consideration by this archeological overview and management plan include:

- o The Archeological and Historic Preservation Act of 1974 (88 Stat. 174, 16 USC 469), which requires that notice of an agency project that will destroy a significant archeological site be provided to the Secretary of the Interior; either the Secretary or the notifying agent may support survey or data recovery programs to preserve the resource's information values.
- o The Archeological Resources Protection Act of 1979 (93 Stat. 721, 16 USC 470aa; this supersedes the Antiquities Act of 1906 [93 Stat. 225, 16 USC 431-43]), with provisions that effectively mean that
 - The Secretary of the Army may issue excavation permits for archeological resources on DARCOM lands (Sec. 4)
 - Anyone damaging an archeological resource on DARCOM lands may incur criminal (Sec. 6) or civil penalties (Sec. 7)
- o 36 CFR 800, "Protection of Historic and Cultural Properties" (44 FR 6068, as amended in July 1982); these regulations from the Advisory Council on Historic Preservation set forth procedures for compliance with Section 106 of the National Historic Preservation Act.
- o Regulations from the Department of the Interior setting forth procedures for determining site eligibility for the National Register of Historic Places (36 CFR 60, 36 CFR 63), procedures implementing the Archeological Resources Protection Act (43 CFR 7) (also published as Department of Defense regulation 32 CFR

229), and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716).

- o Guidance from the U.S. Department of the Army as to procedures and standards for the preservation of historic properties (32 CFR 650.181-650.193; Technical Manual 5-801-1; Technical Note 78-17; Army Regulation 420-40; Army Regulation 200-1; Army Regulation 200-2).

The formulation of archeological plans for DARCOM installations is part of a developing national acceptance of the Resource Protection Planning Process (RP3) (HCRS 1980). RP3 presents an outline for the development of preservation plans, which, in turn, provide an analytical structure for preservation decision-making. This archeological overview and management plan has been prepared with those guidelines in mind.

1.2 THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

The Army Materials and Mechanics Research Center (AMMRC) is located on 48.3 a. in Watertown, Massachusetts, just six miles west of the City of Boston along the northern bank of the Charles River (Figure 1-1). AMMRC occupies the western portion of what was formerly the Watertown Arsenal.

The original Watertown Arsenal, which covered 119 a. opened in 1816. The Watertown Arsenal Laboratories were founded in 1832 and were made a separate entity in 1962. The Arsenal proper closed down in June 1967 and in July of that year the Laboratories were renamed the Army Materials and Mechanics Research Center.

In the 1840's AMMRC's predecessor laboratories developed superior cast iron for cannon. After the Civil War these laboratories pioneered new methods for testing, refiring, and fabricating steel for use in Army weapons. Between the world wars the AMMRC labs used radiography and spectroscopy for steel foundry controls, centrifugal casting of gun tubes, all-welded gun carriages, and molybdenum high-speed tool steel. Today research on steel continues while emphasis has shifted to new, sometimes exotic materials which are very light weight, capable of withstanding very high or low temperatures, and have desirable electrical characteristics.

AMMRC encompasses 30 structures built between 1851 and 1976. The buildings include laboratory, storage, utilities, and technical services facilities, family housing units, officers' quarters and administrative offices. Paved parking lots and roads surround many of the laboratories while some grassy, landscaped areas surround the housing area (Figure 1-2).

The Commonwealth of Massachusetts has an easement for use of AMMRC riverbank land south of North Beacon Street. The Town of Watertown maintains a public park and a marina within this easement on AMMRC property along the northern bank of the Charles River.

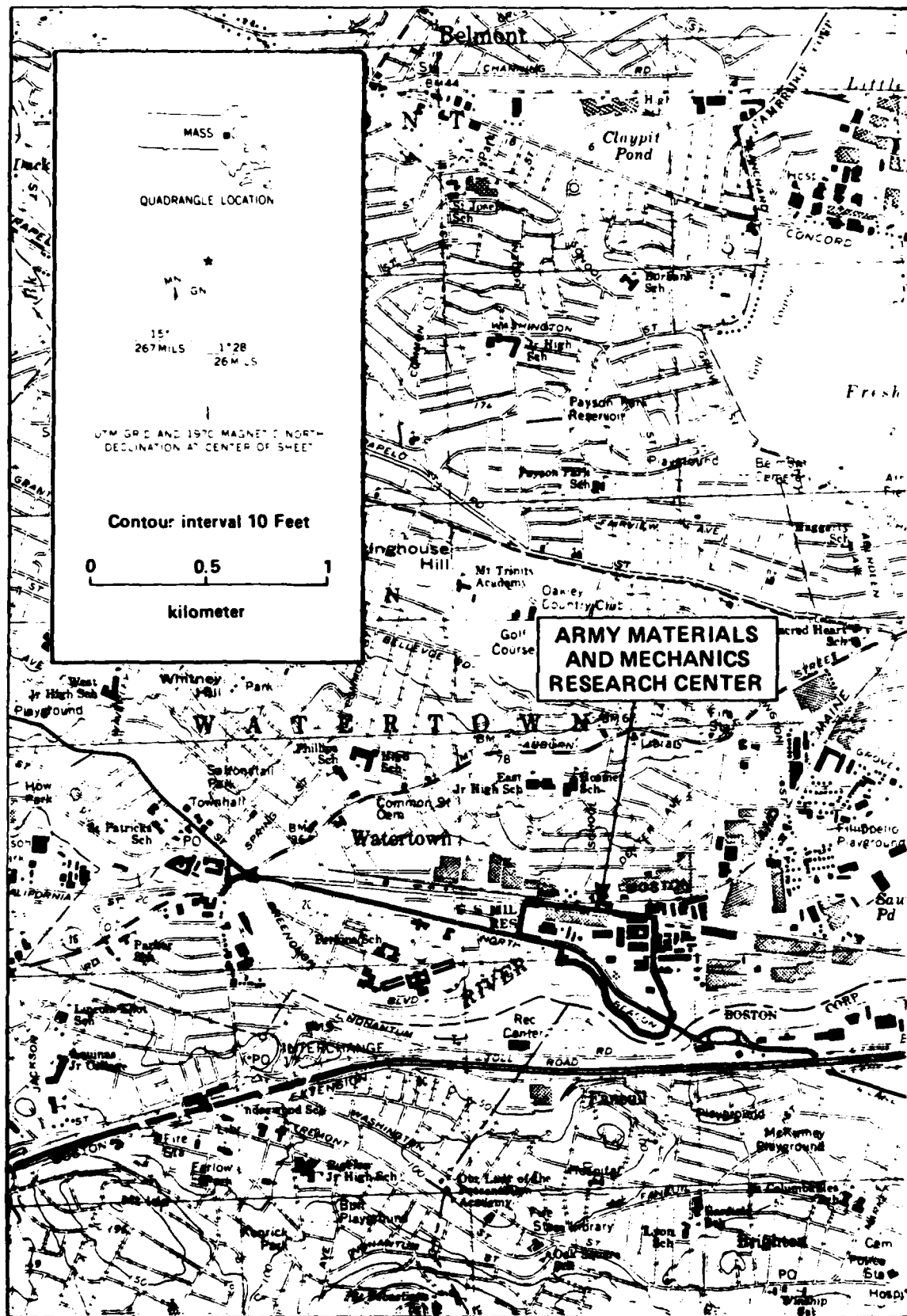


FIGURE 1-1. MAP OF THE GENERAL VICINITY OF THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

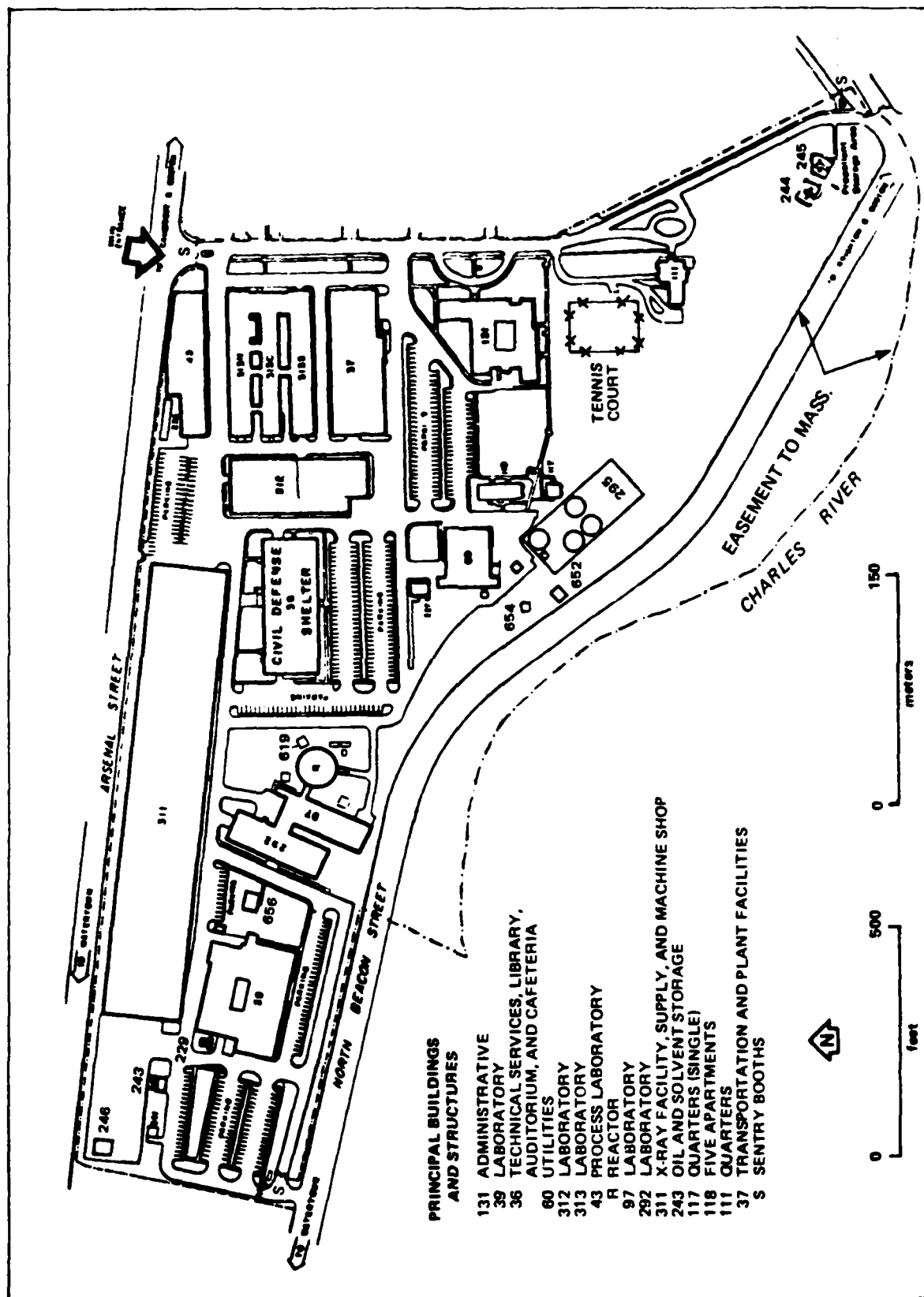


Figure 1-2. MASTER BASE MAP OF THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER.

1.3 SUMMARY OF PREVIOUS ARCHEOLOGICAL WORK CONDUCTED ON THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

The Army Materials and Mechanics Research Center and its vicinity is rich in archeological resources. This section will include a discussion of the one known site located within the present confines of the AMMRC, as well as recorded archeological sites adjacent to the installation.

Site 19MD373 (Powder Magazine site) lies near the site of old powder magazine at the west end of the original Arsenal Grounds. It is located near the former site of Building 45, which is no longer standing. The site was identified as a specific locus of the Watertown Arsenal site (19MD176) by G.B. Frazer in the 1880's. The latter site is a very large--200 m radius--cremation burial complex and occupation site of the Watertown phase of the Late Archaic Susquehanna Tradition. It lies at an elevation of 30-40 ft. above sea level. The site was surface collected by G.B. Frazer in the 1880's. This is probably the site that was re-analyzed by Dincauze (1968). In 1912 S.J. Guernsey of the Peabody Museum and A. Skinner of the American Museum of Natural History, conducted salvage excavations of the cremation pits. They recovered both utilitarian goods and prestige items associated with the burials (Dincauze 1968:19). Artifacts from the site, curated at the Peabody Museum of Harvard University, include diagnostic projectile points (including Atlantic-like, small-stemmed, and Kirk stemmed types) perforators, ground stone plummets, ground stone axes, ground stone adzes, ground stone abraders, ground stone gorgets, bifaces, and flakes.

Arsenal Park, located immediately adjacent to AMMRC's eastern boundary was formerly a portion of the old Watertown Arsenal. The property on which the park is located was exsessed by the General Services Administration in 1967. This exsessed land was subjected to a systematic archeological survey in 1978 (Barfield and Lamberg-Karlovsky 1978). The results of the survey were as follows:

"construction for the ball courts on the eastern part of the site presents no hazard to any cultural remains. The area is the site of industrial plants which long ago destroyed anything of cultural value. Construction of parking lots, swimming pool, and adjoining buildings presents no danger to cultural resources. This area was landscaped in 1909 [sic] and testing revealed no archaeological sites here or on the parade grounds. Construction of the proposed amphitheater is in an area where a significant half-acre archaeological site has been discovered. No work should be permitted in this area without prior planning, nor should heavy equipment be allowed to enter the site area" (Barfield and Lamberg-Karlovsky 1979:2).

More intensive testing in the form of excavation pits and borings occurred at the location of the proposed amphitheater. The site, designated 19MD332, and known as both the Amphitheater site and the Watertown Arsenal Park Site, was judged to be about 20 x 30 m in size, and relatively intact, in addition to being very shallow. A random sampling strategy with three parts was employed. Two parts were sampled intensively and one part was sampled to maximize extensive coverage.

Excavation was done in square meter pits, with each pit divided into quadrants and excavated in 10 cm levels. The total number of pits excavated was 64. Several features were uncovered: a fire pit that may have been used to roast nuts; two smaller pits which may have been either storage pits or areas of overflow from a fire pit; a large pit used perhaps as a leaching pit for nuts; a fire pit and a storage pit. Artifacts included diagnostic projectile points (2 Stark points, 1 Brewerton Eared-Notched point, 1 Squibnocket Triangular, 3 Atlantic points, 2 Wayland Notched points, 2 Orient Fishtails), bifaces, a perforator, a spokeshave, blades, scrapers, utilized flakes, a hammerstone, preforms, possible rejects, and debitage (Barfield and Barber 1980). The Watertown Arsenal Park site was determined eligible for the National Register of Historic places on March 2, 1979.

The Stone Farm site, 19MM247 lies adjacent to Sawins Pond and Sawins Brook at an elevation of 50 ft. above sea level. The site is located at the very eastern edge of the original Watertown Arsenal complex. This site was partially destroyed by building and road construction. The flat area between Greenough Street and Sawins Pond may be somewhat less disturbed. It is important to point out that sites with an "MM" numbering system originated at the University of Massachusetts/Amherst, and in general these sites have no locational information in Massachusetts Historical Commission files.

Upriver from the Watertown Arsenal and adjacent to it is the Cassidy Farm site (19MM245). This site yielded Late Archaic and Late Woodland period artifacts including diagnostic projectile points (Atlantic-like, Orient Fishtail, Squibnocket-Stemmed, Wayland-Notched), untyped side- and corner-notched projectile points, large triangular points, perforators, full-grooved axes, steatite sherds, drills and Mansion Inn blades. In addition, features were uncovered.

The Perkins Institute site, 19MD177, is located across North Beacon Street from the old Watertown Arsenal grounds. It lies at an elevation of 50 ft. above sea level, on the gravel terrace behind the School for the Blind, between North Beacon Street and the Charles River. A shallow, spring-fed pond, supported by massive clay beds, lies at the same elevation a bit north of the site (Dincauze 1973:33). Artifacts from the Perkins Institute site include diagnostic projectile points (Orient Fishtail, Woodland lanceolate, Jack's Reef Corner-Notched, Wayland Notched, Susquehanna Broad-like, Wading River, Squibnocket Stemmed, Squibnocket Triangular, Atlantic, Dudley Notched, Levanna, Rossville-like), untyped points, a steatite pot, Vinette I pottery, bifaces, a ground stone plummet, a ground stone axe, an edge tool, and a side-notched pebble. The site is disturbed, if not destroyed, due to the construction of both the Perkins School for the Blind in 1912 and Greenough Boulevard.

The Union Market Station site (19MD372) is situated close to AMMRC at an elevation of 50 ft. above sea level where School Street meets Greenough Boulevard. This site yielded a human burial with associated copper beads, lithic bifaces, an untyped point, and a Neville-like point. The site is believed to have been disturbed by the construction of roads and the old Watertown Arsenal.

A site numbered 19MM80 or WALL02, is located at an elevation of 35 ft. above sea level at the confluence of Sawins Brook and the Charles River. This was a multi-component site at the very eastern edge of the old Watertown Arsenal complex. Artifacts from this site include diagnostic projectile points (Atlantic-like, Orient Fishtail, Edfen-like, Stark-like), untyped projectile points and grit-tempered pottery, steatite, a ground stone pestle and ulu, and flakes and bifaces.

An isolated Orient Fishtail point was recovered from the park between Charles River Road and the Charles River, between the Perkins School and the Yacht Club. This area is just west of the AMMRC facility.

Two sites, 19MD268 and 19MD374, are located to the southwest of the Mt. Auburn Cemetery, at the northeastern intersection of Grove Street and Coolidge Avenue. 19MD268 lies at an elevation of 35-40 ft. above sea level; 19MD374 at an elevation of 40-50 ft. above sea level. 19MD374 included a human burial, a ground stone pestle, bifaces, and diagnostic projectile points (Squibnocket Broad-like, Squibnocket Triangular, Otter Creek, and Orient Fishtail). A date within the end of the late Archaic period may be assigned to this site.

19MD175 lies to the north of 19MD176 at an elevation of 40-50 ft. above sea level, to the west of Sawins Brook. The site is a Middle Archaic-Late Woodland site. Artifacts recovered from the site include diagnostic projectile points (Susquehanna Broad-like, Rossville-like, Atlantic-like, Orient Fishtail, Neville-like, Woodland Stemmed); ground stone pestles, abraders, gorgets, adzes; flakes, untyped projectile points; untyped pottery; and features such as caches and pits.

1.4 THE SOCIOCULTURAL CONTEXT OF THE ARCHEOLOGICAL RESOURCES AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Historically, Watertown has been a blue collar community (see Section 2.2.3) whose residents supplied a labor force for local factories and for industries in the Boston metropolitan area. In recent years the average educational level of Watertown residents has increased as university-associated individuals sought available and more affordable housing outside of the immediate university communities (McSweeney, 1983, personal communication).

Watertown's present population is predominantly white (about 85%) with representatives from Black, Chinese, and Asian Indian minority populations. The 1980 census lists no American Indians or Eskimos. Almost 50 percent of the town's residential units are privately owned (McSweeney 1983, personal communication).

The ethnic makeup of Watertown's population is heterogeneous. In the seventeenth century, Watertown's first non-Native American settlers were English. Significant non-English immigration into Watertown began in the mid-nineteenth century, 1855-1875, when the Irish community established itself as a politically vocal group. Between 1875-1921 Italian immigrants settled in Watertown. In the 1960's Watertown's Italian-descent residents represented the town's second largest ethnic group. Canadians immigrated to Watertown in the 1880's. Their

descendants represent the largest ethnic group in Watertown. During the last quarter of the nineteenth century Armenians immigrated to Watertown. Their numbers increased to 20 percent of the Watertown population. They continue to maintain a strong ethnic presence in Watertown. Sizeable Greek and Jewish communities also reside in Watertown (Hodges 1980).

While no Native American communities are known to have remained in the project area since late prehistoric/early historic times, there are Native American descendants in the Boston area who maintain an active interest in the disposition of archeological Native American cultural resources. Of particular concern to the Massachusetts Commission on Indian Affairs, directed by John Peters (Slow Turtle), are the occurrences and treatment of Native American burial sites. As noted in Section 1.3, areas of Watertown in the immediate vicinity of AMMRC have yielded numerous prehistoric burials.

Since its inception in 1816 Watertown Arsenal (and since 1967, AMMRC) has been of local popular interest attracting numerous visitors. Mid-nineteenth century newspapers depicted families promenading along the Arsenal Quadrangle (Hodges 1980:76). Governors, Presidents, and visiting dignitaries have made speeches at the Arsenal before public audiences.

The Arsenal's role in the development of Watertown has been as a key community employer. Women predominated in the labor force during the Civil War. The arsenal employed 2010 civilians in 1920 and 9900 civilians during World War II. AMMRC currently employs approximately 600 civilians.

Since the early twentieth century, the Arsenal has offered training opportunities in conjunction with local educational institutions such as Massachusetts Institute of Technology, Wentworth Institute, Somerville Vocational School, The Brookline Trade School, and Northeastern University. In 1907 such programs were initiated for Ordnance Department officers. In 1940 the programs were expanded to include civil servants. Training was offered in such fields as mechanics, engineering, radiography, magnetic testing, physics, chemistry, and metallurgy.

2.0

AN OVERVIEW OF THE CULTURAL AND RELEVANT
NATURAL HISTORY OF THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

2.1 THE PHYSICAL ENVIRONMENT

2.1.1 Earth Resources

Watertown, Massachusetts is situated in a fertile strip between the Mystic River and the Charles River, between the cities of Cambridge to the east and Waltham to the west (Hurd 1890:318; Robinson and Wheeler 1930:9). The town lies within the Boston Basin physiographic region (Dincauze 1968:9). The Basin is bounded by:

the eastern escarpment of the eastern plateau and tidewater. It consists of low, level terraces ramified by arms of salt-water streams that are bordered in places by comparatively narrow tidal marshes. The terraces rise from 10 to 50 feet above sea level and are broken by low, smoothly rounded hills or drumlins which rise from 100 to 150 feet above the level of the terraces and are the outstanding features of the basin (Latimer and Lanphear 1924:2, quoted in Dincauze 1968:9).

The Army Materials and Mechanics Research Center lies on what used to be a low terrace (30 ft. above sea level) composed of Merrimac gravelly sandy loam (Dincauze 1968:9; Barfield and Barber 1982). This soil occurs on glacial outwash deposits (USDA Soil Conservation Service 1982). The substratum of clay, even when mixed with sand and gravel, holds a great deal of moisture, accounting for the moist and productive bluffs and the abundance of springs in the town (Hodges 1980:30; Hurd 1890:322). The bedrock in Watertown is composed of conglomerates and shales. There are no local outcrops in the town (Barber and Lamberg-Karlovsky 1978:8; Hurd 1890:321).

Pleistocene deposits consist of an interstratified series of four drifts and three marine clays below more recent deposits (Dincauze 1973:27). The top layer of clay is dated to the Middle Wisconsin glaciation. Following this there was a retreat of sea level and the clay was oxidized, then partly buried by Late Wisconsin moraines and outwash (Kaye 1961, cited in Dincauze 1973:27).

2.1.2 Water Resources

The Charles River winds through the southern portion of Watertown. Many surface brooks and streams flowed down from the hills, emptying into the River (Hodges 1980:30). The old Watertown Arsenal, including AMMRC, occupied approximately 125 a. stretching for 1/2 mi. along the bank of the Charles. Sawins Brook, a spring-fed tributary of the Charles River flowed along the northeastern edge of the old Watertown Arsenal (Dincauze 1973:31). The brook joins Sawin's Pond north of the old Arsenal. A small, shallow spring-fed pond, supported by massive clay beds, lies at an elevation of 509 ft. about 800 ft. north of the river and west of AMMRC on the grounds of the Perkins School for the Blind (Dincauze 1973:33). Arsenal Street, running along the north side of the AMMRC and old Watertown Arsenal buildings, lies near marshland and mudflats. The Amphitheater site (sections 1.3 and 2.2.1) located in present-day Arsenal Park, is surrounded by these mudflats.

2.1.3 Modern Climate

The average summer temperature of the general vicinity of AMMRC is 70°F, and the winter average is a few degrees below freezing (Dincauze 1973:29). Annual rainfall averages 44.4 in. in the vicinity. At AMMRC the average monthly rainfall is 3.22 in. and the average annual rainfall is 38.76 in. Average monthly temperature is 50.6°F. The average last killing frost in spring is April 14 and the average first killing frost in autumn is on October 26.

2.1.4 Plant Resources

Latimer and Lanphear characterize the Watertown environment as "the transitional zone where the forest flora of the north blend with that of the south. The region was originally covered with a mixed growth of white pine, oak, chestnut, poplar, hard and soft maple, and white and gray birch" (Latimer and Lanphear 1924:6). The southern perimeter of AMMRC is surrounded by marshlands and mudflats and their associated inland wetland vegetation like red maple. Associated understory vegetation would have provided a wide range of plant species useful as food and medicinal sources by aboriginal populations.

2.1.5 Animal Resources

Prior to modern land development, the area surrounding AMMRC supported a variety of animals and birds in the forested uplands as well as fish, shellfish, and birds in the lowland marshes, fresh water, brackish water, and salt water (Dincauze 1968:9). Anadromous fish such as shad, alewives, cod and salmon could be trapped in the spring; in early summer bass could be taken. Mussels and clams could be collected from rocky or muddy shores and eels from marshes (Dincauze 1974:29). The upland woodlands contained white-tailed deer, moose, bear, chipmunk, squirrel, raccoon, porcupine, woodchuck, gopher, skunk, hare, cotton-tail rabbit, mole, wild turkey, ruffed grouse, quail and partridge. Brooks which joined the river supplied mink, otter, muskrat, beaver, ducks, brant, geese, turtles, and snakes.

2.1.6 Paleoenvironment

The prehistoric environment of the Watertown area was very different from today's. The Pleistocene glaciation throughout the region lasted until approximately 9000-8000 BC. Glacial ice disappeared from the uplands sooner than in the major river valleys. A general warming trend followed the last glaciation. By 8000 BC lakes were formed in low-lying areas. Marshes, swamps and wet meadows were created and glacial run-off formed deltas at the mouths of river drainages. Few fish species appear to have been available from these water sources. The environment at this time may be characterized as a tundra with sedge vegetation. This environment would have supported cold-adapted fauna, such as mammoth, mastodon and giant beaver, all presently extinct. Low biomass in the tundra supported small groups of these mammals.

As the tundra advanced to the north, forest species from the south replaced it. An open forest, characterized by such species as spruce, poplar, and birch, began to establish itself after 8000 BC. This open forest was succeeded by an open park woodland environment with spruce, ash, hornbeam and oak as the dominant tree species. Palynological data indicate that pine reached a maximum between 8000-7000 BC. The forest at this time had a dense tree cover and the climate was warmer and dryer than today.

By 7000 BC a mixed forest characterized the region. Between 7000-3000 BC, the warming and drying climatic trend continued. The postglacial thermal maximum reached its peak around 4000 BC. Sea level rose at this time and salt water transgressed into fresh water rivers, creating estuarine zones as in the Charles River. As the last glacier melted, the large ice-dammed inland lakes drained, and the present Charles River channel course was established (Dincauze 1973:27). Beginning around 6000 BP, the sea began to invade the Charles River valley west of Boston. Rising sea levels forced the fresh groundwater table to rise above the sea water. In lowlands near the new shoreline freshwater swamps developed (Dincauze 1973:29). At about 3000 BP, the head of the intertidal zone was located approximately at AMMRC. The water in the river at this point was fresh (Barfield and Barber 1982:24-25). Through time, the intertidal zone moved upstream.

Pollen analysis indicates an increase in ragweed and a decrease in trees between 7000-3000 BC. Deciduous species increased in frequency resulting in a temperate oak forest. Plants and animal species available for human consumption also increased in diversity as did anadromous fish, sea mammals, birds, terrestrial mammals, vegetable foods and shellfish.

By AD 1 hickory and chestnut appeared from the south. A cooling trend occurred world-wide from AD 1300 to 1800 followed by a warming trend. A summary of the region's environmental history is presented in Table 2-1.

The natural limit of the Charles River estuary was located near the Army Materials and Mechanics Research Center prior to the damming of the river in 1908 (Barfield and Barber 1982:24; Barfield and Lamberg-Karlovsky 1978:15; Dincauze 1968:9). This section of the river was the

Table 2-1. A SUMMARY OF THE ENVIRONMENTAL HISTORY OF THE AREA OF THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Date	Inferred Climate (Vinceuze 1974; Funk 1978)
2500 BP - present	Gradual warming trend to present climate
3000 - 2500 BP	Climatic cooling; stabilization of shorelines; density of hickory declines; chestnut and other northern species increase
5000 - 3000 BP	No information available
8000 - 5000 BP	Increase in ragweed pollen; decrease in tree pollen; deciduous tree species increase; temperate oak forest; mast-producing trees; temperatures above modern range
9000 BP	Mixed forest in which pitch and white pines predominate
10,000 - 9000 BP	Warm, dry climate; lakes and ponds established; pine pollen maximum; dense tree cover
10,000 BP	Open park woodland; dominant tree species include spruce, ash, oak, hornbeam; warming and drying trend continues
11,000 - 10,000 BP	Warming trend begins; sea level rises; sedge vegetation; deltas form at the mouths of river drainages created by glacial run-off; lakes form in low-lying areas; tundra environment predominates; temperatures range from arctic to subarctic
11,000 BP	Pleistocene glacial mass present

head-of-tide of the Charles River, that furthest upstream portion of the river where the water level rises and falls with the tides (Barfield and Barber 1982:vi). This area, at the head of the intertidal zone, is fresh water and provides sizeable seasonal runs of anadromous fish. Fish traveling upstream annually to spawn were an important component of the diet of prehistoric communities in the Watertown area. Shellfish and more permanent fish populations inhabiting the waters downstream from the head-of-tide of the Charles River estuary provided food at other times of the year (Barfield and Barber 1982:24). In addition, swift-running brooks which joined the Charles River in Watertown attracted communities of mink and beaver which could be exploited by prehistoric inhabitants (Robinson and Wheeler 1930:3).

2.2 THE CULTURAL ENVIRONMENT

This section presents a summary of the culture history of the region in which AMMRC is located. Whenever possible an attempt has been made to relate this information to the actual location of AMMRC. However, the size of the region considered in the discussion of any one period varies with the amount of data available. Periods for which data are scanty are therefore discussed in more general terms. An outline of the cultural chronology of the AMMRC area is presented in Table 2-2.

2.2.1 Prehistory

Paleo-Indian. The Paleo-Indian period represents the earliest human occupation of North America. Diagnostic remains associated with the Paleo-Indian period are fluted projectile points and, in the southwestern United States, extinct fauna such as mammoth and mastodon. Other artifacts which typify the Paleo-Indian tool assemblage are spurred flake scrapers, twist drills, large bifaces, pieces esquillees, and sidescrapers. Sites from this cultural period in the Northeast are often disturbed and/or have poor or no preservation of faunal materials.

The park tundra typical of the Watertown area during Paleo-Indian times was an especially patchy or heterogeneous environment. Mammal diversity was low, but some species may have aggregated at certain times. In general seasonal availability of resources, low stability of resources, and low predictability of resources characterized the environment. This patchy unpredictable environment would be best utilized by small numbers of people who travel from place to place seasonally. A low population density is interpreted for Paleo-Indian people. Artifacts made from non-local materials occur at many sites in New England. This is believed to have resulted from migration, exchange or transport behavior. Although some large Paleo-Indian sites are known in the eastern North America; most are quite small, suggesting small groups of people who were seasonally mobile. There are no recorded Paleo-Indian sites at AMMRC or in its vicinity. A single example of an Eden-like point was recovered at the multi-component Watertown Arsenal Site, (19MD176), on the sandy terrace overlooking the Charles River (MHC 1982:15-16).

Early Archaic (7500-6000 BC). The evidence for Early Archaic occupation is essentially the distribution of bifurcate-base, Kirk, and Plano

Table 2-2. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Cultural Unit		Date	General Settlement Patterns	General Subsistence Systems	Kinds of Archeological Remains Representative of Period
Tradition	Period or Phase				
Euro-American	Urbanization	AD 1850 to Present	Urban - Industrial	Commercial, manufacturing and technology industries; service industries; urban market economy	Dominance of American and imported manufactured goods; metal, glass and brick building materials; automobile-associated artifacts; high technology-related items
	Industrialization	AD 1700 to 1858	Rural - suburban pattern gives way to expanding residential, commercial and industrial communities	Livestock raising and cottage-industry gives way to factory work orientation	Metal, glass, and brick building materials; roads, underground pipe; ceramics, metal and glass goods; textiles, etc.
	European - Native American Contact	AD 1550 to 1700	Coastal communities lose thousands of their population to epidemics; shift in settlement locations due to disease, displacement, fragmentation, white settlement. Communities are still semi-mobile	Early contact: continuation of hunting, fishing, gathering, and horticulture with modifications due to new trade relations, fur trade, trading posts. White settlement intrusions, missionary activity, warfare. Later contact: Native American populations become diminished and part of the institutionalized poor	Traditional Native artifact forms made with imported raw materials; wampum beads; European trade goods such as glass beads, copper kettles, clothing, glass bottles, rings, spoons, thimbles, iron tools
Native American	Late Woodland	AD 1000 to 1500	Spring and fall base camps in estuary and riverine zones; annual round within restricted territories around river-basins; coastal zone intensively occupied; increased sedentism; higher population density	Introduction of cultigens; hunting; fishing; gathering; horticulture	Levanna points; shell-tempered pottery; shell middens; hoes
	Early-Middle Woodland	1000 BC to AD 1000	Annual round base camps	Increased use of coastal resources; hunting; fishing; gathering	Shell middens; platform-pipes; blocked-end tubular pipes; lanceolate points; side-notched points; Meadowood points; grit-tempered, rocker-and-dentate-stamped pottery

Table 2-2. A SUMMARY OF THE CULTURAL CHRONOLOGY OF THE AREA OF THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER (Continued)

Cultural Unit					Kinds of Archeological Remains Representative of Period
Tradition	Period or Phase	Date	General Settlement Patterns	General Subsistence Systems	
Late Archaic		3000 to 1000 BC	River-basin territor- iality; decreased mobility; higher popu- lation density; central- based foraging pattern; base camps. Burial ceremonialism; alternating dispersal and aggregation	Hunting of small game; collection of shellfish, anadromous fish, seeds, nuts	Squibnocket, Brewster, small-stemmed points; ground stone axes; adzes; gouges; mortars; pestles; steatite bowls; shelldens on coast; burial cremations; local raw materials
Middle Archaic		6000 to 3000 BC	Restricted foraging pattern; hunting, gathering and fishing on seasonal basis; larger sites with more varied locations; more numerous sites; long-distance exchange or transport	Hunting of small- and medium- sized mammals, collection of shellfish, anadromous fish, and vegetable foods	Merrimac, Neville, Stark projectile points; scrappers; perforators; semi-lunar knives, fishhooks;
Early Archaic		7000 to 6500 BC	Small, mobile bands seasonal base camps; sites located preferentially in lowlands	Foraging for large and small game; collecting of wild vegetable foods	Bifurcate-base points; Kirk points
Paleo-Indian		9000 to 7000 BC	Small, highly mobile bands of hunters and gatherers. Sites on high, well-drained land, especially knolls, drumlins, terraces	Hunting of large and small game; some wild vegetable foods are gathered	Fluted projectile points; utilized flakes; graves; bifacial knives; drills; small end-scrappers

points. During this time period, temperate species were expanding their ranges northward and eastward. Archeological evidence in the northeast suggests that Early Archaic sites cluster in the lowlands, along major rivers, on the coast, or along marsh and swamp lands. Sites from this period in the study area may be inundated due to the gradual rise in sea level since postglacial times. Early Archaic communities most likely exploited more vegetable foods and fish resources than did their Paleo-Indian predecessors. An Early Archaic component is reported from site 19MM80 or WALLO2 (East Watertown), located at the confluence of Sawins Brook and the Charles River at an elevation of 35 ft. above sea level. A single bifurcate-base projectile point was found at the Watertown Arsenal Site (19MD176) (MHC 1981:16).

Middle Archaic (6000-3500 BC). The Middle Archaic coincides with the postglacial thermal maximum which occurred 6000-2000 BC, peaking around 4000 BC. The climate became warmer long before the warm forest association was established. The rise in sea level at this time affected the loci of food resources. This time period is characterized by the development of regional cultural adaptations. Seasonal specializations developed as part of a larger pattern of an annual-round subsistence system. There may have been an increase in population, or simply a higher visibility of archeological materials. The environment was typified by diverse species of plants and animals demonstrating an increasing density of resources in general. Human communities utilized seasonally-specific resources as well as generally available resources. Spring sites were generally aggregation sites and dispersal occurred in the fall, resulting in a pattern of alternating seasonal aggregation and dispersal throughout the year. Raw material use was much more localized. Social territories were possibly restricted due to an increase in population density. The Amphitheater site (see section 1.3), located immediately east of AMMRC, is reported to include a Middle Archaic component, as does the multi-component East Watertown (19MM80 OR WALLO2) site. Other Middle Archaic artifacts have been found in the Town of Watertown though their exact provenience is unrecorded.

Late Archaic (3500-1000 BC). Three different traditions have been delineated for the Late Archaic in the Northeast. The Laurentian Tradition, characterized by Brewerton points, often occurs on the same sites as do the other traditions. The Narrow-Stemmed Point or Small-Stemmed Tradition is the earliest and occurs most frequently along the coast and in inland river valleys. The Susquehanna or Broad-Point Tradition may have been intrusive from the Middle Atlantic. It occurred concurrently with the Narrow-Stemmed Point Tradition for about 100 years. The Susquehanna Tradition is subdivided into the Atlantic, Watertown, and Coburn Phases. The latter two traditions merged into the Orient Phase at the end of the Late Archaic period.

A large number of artifacts are associated with the Late Archaic, especially those representative of the Narrow-Stemmed Point Tradition. There is much use of local raw materials. Little evidence exists for widespread trade networks. Instead there seems to be regional intensification and specialization. A tendency toward small territories is marked. The clustering of Late Archaic sites suggests limited areal

extent of the seasonal round. The settlement-subsistence system suggests considerable subsistence diversity, with specialized techniques for getting each type of resource. Based on the large number of artifacts and the frequency of sites, a population density higher than in earlier periods is inferred. Widely dispersed small communities which lived in restricted territories was probably the pattern of Late Archaic settlement. Each community would have developed specialization for the range of food in its own territory. Tool assemblages therefore differ markedly according to location and season. Given restricted territories, there was probably an increase in sedentism.

The Late Archaic is also characterized by an increase in burial ceremonialism. There are isolated burials as well as cemeteries, cremations as well as inhumations. Susquehanna burials in southern New England seem to have been only cremations. The vicinity of the Watertown Arsenal sites of the Watertown Phase of the Susquehanna Tradition that include cremation burial components (19MD373, 19MD175). Burial pits occur on what used to be a low terrace of glacial outwash deposits. The Amphitheater site contains a Late Archaic occupation of considerable intensity. Sites 19MM245 (Cassidy Farm, upriver from the Watertown Arsenal and adjacent to it), 19MM244 (near Lemon Brook), 19MM80 (WALLO2, East Watertown), 19MD374 (Joshua Stone), and 19MD268 (Davenport Cache), located near Mt. Auburn Cemetery at northeastern intersection of Grove Street and Coolidge Avenue, 19MD177 (Perkins Institute site), behind Perkins School between North Beacon Street and the Charles River, all contain Late Archaic occupational remains. In addition, site 19MD372 yielded human burials. The number of Late Archaic artifacts from Watertown and its vicinity suggest a fairly high population for the area during this period. Orient phase materials are present in Watertown (MHC 1982:18).

Early - Middle Woodland (800 BC-AD 800). Ceramics became a part of the artifactual inventory at this time. They appear in some areas where steatite bowls had previously occurred. Vinette I pottery, the earliest type, is grit tempered and manufactured by the coil method. The vessels are conoidal in shape and the surfaces are textured. A second type of ceramic is smooth-bodied or incised, fiber- or steatite-tempered, flat-bottomed, and manufactured by modeling. Evidence of Adena influences from the west occur in the form of clay and stone blocked-end tubular pipes, zoned rocker-stamping on pottery, ceremonial graves, gorgets, and later, platform pipes.

During the Early-Middle Woodland there is an increase in sedentism and localization. The subsistence base is essentially a continuation of the Late Archaic pattern. There is evidence that some inland sites were abandoned at this time in favor of year-round settlement along the coast. In addition to coastal sites, large sites occur inland near rivers on high flood plains while smaller sites are located along streams. Burials are located on terraces over rivers. Sites 19MM80 (WALLO2, East Watertown), and 19MD177 (Perkins Institute), both multi-component sites, include Early-Middle Woodland components. The Watertown sites have, in general, produced significant Early and Middle Woodland Materials (MHC 1982:20).

Late Woodland (AD 800-European Contact). Cultigens were introduced into the Northeast from more semi-tropical zones at this time. Three species of cultigens appeared: corn, squash, and common bean. At approximately 1000 AD the three species occur together in New England. In addition to the cultigens, a series of cultural traits spread to New England from the Mississippian cultures of the Midwest. These included: square or rectangular houses, triangular points suggesting the use of the bow-and-arrow, globular pottery often shell-tempered, and deep pits. The thin and acidic New England soils in the AMMRC area made farming less productive than in other regions as did the variable duration of the growing seasons. In response, despite the introduction of horticulture in the Late Woodland period, villages were still only semi-permanent. In general, however, there was an increase in both sedentism and population during this period. The following sites in Watertown include Late Woodland artifacts: 19MM245 (Cassidy Farm), 19MM80 (WALLO2, East Watertown), and 19MD177 (Perkins Institute).

2.2.2 Ethnohistory

In 1630, English settlers found a well-established village of Indians near the falls at the head of the Charles River in Watertown. The village residents belonged to the Pequossette tribe, a subtribe of the Massachuset (Hodges 1980:9). Roger Clap documented this village at the present site of the Perkins School for the Blind (Hodges 1980:9; Hurd 1890:378). Corn fields were planted near the river. At spring planting time, the tidal river provided thousands of herring which the Indians netted at the river falls (Hodges 1980:9).

Fishing sites in Watertown continued to be utilized by Native Americans in the seventeenth century (Barfield and Lamberg-Karlovsky 1978:9; Dincauze 1974:61). A fish weir for trapping alewives, shad, and salmon was located in Nonantum, at the northeastern corner of Cambridge Village (Jackson 1854:79; Rowe 1930:7). Many spots along the Charles River were known for having been used by the local aboriginal population for drying fish (Jackson 1854; Rowe 1930). Robinson and Wheeler (1930:12) document a weir in Watertown at the point opposite the present Perkins School for the Blind tower where the river becomes narrow and shallow for the first time. Bath houses currently occupy this land. At the eastern end of Watertown, Robinson and Wheeler (1930:18) report evidence for "the frequent burning over by the Indians... [they] had left the largest trees but no underbrush".

No other historic aboriginal village sites have been recorded in Watertown (Barfield and Lamberg-Karlovsky 1978:9; Dincauze 1974:61). Permanent historic aboriginal occupation sites may have been located outside of Watertown, closer to locations of English trading posts or mission towns. One temporary settlement of Praying Indians, survivors of the Deer Island internment, was known to have been occupied in the summer of 1676, following King Philip's War.

2.2.3 History

Sir Richard Saltonstall and his minister, George Phillips, founded Watertown in July 1630 (Hodges 1980:9; Hurd 1890). In 1654 Johnson

described the Watertown area as a "fruitfull plantation and of large extent, watered by many pleasant streams and small rivulets, which hath caused her inhabitants to scatter..." Johnson further reported 160 families living in Watertown at the time (Francis 1830:41). The original town center was located near the present Cambridge-Watertown boundary. The township included today's Watertown, Waltham, Weston, and part of Lincoln (Barfield and Lamberg-Karlovsky 1978:11).

In the first half of the seventeenth century, the economic life of the Watertown plantation was based on farming, fishing, and animal husbandry. This form of subsistence necessitated a dispersed settlement pattern, despite the fact that in 1635 the town required all its residents to live in a nucleated area around the first meetinghouse (Francis 1830:26). Fishing was a major enterprise in Watertown until water-powered mills and the building of dams blocked fish migration in that portion of the Charles River (Francis 1830; Hurd 1890). Land at the Watertown Arsenal location was not particularly suitable for agriculture (Barfield and Lamberg-Karlovsky 1978:12). A fish weir was constructed in 1632 between the Galen Street Bridge and the landing-place at Dorchester Field downstream from the present bridge. [All the high land near the river, where the Perkins School and the Watertown Arsenal now stand, was known in the Watertown Records as 'Dorchester Fields' (Robinson and Wheeler 1930:12)]. A tract of land above and below the weir along the river's south bank was known as "weirland"; here the fish was distributed for fertilizer, laid out to dry, or salted in barrels for shipment to England (Hodges 1980:19; Robinson and Wheeler 1930:39). John Oldham was granted a farm opposite the "Weirland" (Hodges 1980:20).

Watertown followed the settlement type of the early historic period (1625-1675) known as the organic village (MHC 1982:43-44). The organic village type was usually situated at an existing native trail junction and focused around a meetinghouse and burial grounds site (MHC 1982:44). In Watertown the fields around the town center were held in common and were subdivided according to the East Anglian enclosed field system (MHC 1982:44). This land division method gave large, multi-purpose parcels to individuals; this usually resulted in a dispersed settlement pattern (MHC 1982:44).

The first water-driven mill was built by Thomas Mayhew in 1634 at the river falls (Hodges 1980:21). A stone dam was built at the rapids to hold back water for the mill and a canal brought water from above the dam (Hodges 1980:21). Mill Creek, as it was known, was the oldest millrace in continuous use in America (Hodges 1980:21). Farmers from surrounding towns brought their grain here for milling and the place became the new focal point in Watertown (Hodges 1980:23). A road led east from the mill town to Saltonstall's homestead, following an Indian trail; this is currently Mt. Auburn Street (Hodges 1980:23).

In sum, between 1675 and 1775, Watertown was a small community oriented around grazing, agriculture and fishing. Its products were used locally and shipped to the urban markets of Boston (MHC 1982:52). In addition, the mills in Watertown played a significant role in the economy of the surrounding region (MHC 1982:52).

The eighteenth century saw a decline in the cattle industry in Watertown and the community began to turn to sheep raising in 1700 (Hodges 1980:43). The owners of common pasture land began selling off their land (Robinson and Wheeler 1930:50). The fish weir, upriver from the present site of AMMRC, below the falls, was still in use through the early 1800's (Francis 1830:116-117, cited in Barfield and Lamberg-Karlovsky 1978:12-13). The old bridge over the river was replaced to keep up with the traffic that crossed the river carrying people and goods from the coastal towns to the settlements upstream (Hodges 1980:43).

Manufacturing began in Watertown at the beginning of the nineteenth century. The population at this time was 2000 (Hodges 1980:85). Wealthy estates and new manufacturing companies and other industrial enterprises coexisted in the town (MHC 1982:64). Small factories manufacturing chocolate, paper, dye, soap, candles, and cotton cloth were built upriver from AMMRC. Workers' houses were set up on both banks of the Charles River near the factories. The surrounding farms supplied some of the labor in the mills. By mid-century the population had increased to 3000 people. Between 1855-1875 the population doubled, mainly as a result of immigration from Ireland, Canada, Armenia, Greece, Italy and partly as a result of Boston residents moving to Watertown for jobs and housing.

The construction of the first phase of the Watertown Arsenal in the second decade of the nineteenth century seems to have been the first major non-residential construction in the Dorchester Fields area. The Perkins School lies on the grounds of the former Stickney estate just upriver from AMMRC; it was not built there until 1912.

In the 1870's a section of Watertown, a triangular area of 35 a. between the Fitchburg Railroad tracks and the hill along Walnut Street, became a center for a prosperous cattle trade (Hodges 1980:115). Cattle pens, housing for cattlemen and railroad workers were constructed; these were replaced by a series of industries, currently the New England Telephone Co. between the Aetna Mills (formerly Bemis Mills), the cattle stockyards, factories in Watertown Square and on the South Side of the river, at the end of the nineteenth century Watertown was a thriving factory town and a crossroads for east-west traffic.

The twentieth century brought further changes to the town. In 1912 the first street car was extended to Watertown; Watertown became an even more popular place to live and the hub of the transportation network west of Boston (Hodges 1980:151). In 1927 the parcel of land known as the Delta was dedicated as part of the beautification of the riverbank. The town of Watertown was granted the deed to the land on the condition that no structure be built on it, that no trees along the north bank would be disturbed (Hodges 1980:152). Nonantum Road was constructed on the south bank, requiring a narrowing of the river and the removal of old chimney stacks of the gas work (Hodges 1980:152). The Hood Rubber Company in East Watertown became an important employer in the town, noted especially for its hiring of many immigrant Armenians and for being a pioneer in employee relations (Hodges 1980:153, 156). Watertown experienced a steady residential expansion through in-filling as neighborhoods of single-family, and occasionally two-family homes were constructed along

the main railroad paths and the trolley lines (MHC 1982:96). The continued process of urbanization created smaller, more specialized districts in the town (MHC 1982:107).

During the period immediately following World War I Watertown experienced rapid business and population growth between 1920 and 1930 the population increased from 21,000 to almost 35,000. Large agricultural estates were subdivided into hundreds of house lots, streets were paved, and underground utilities were laid (Hodges 1980:161). This post-war population and diversification resulted in residential expansion, the development of new sections of town and the construction of new libraries, schools, and transportation links (Hodges 1980).

Following World War II, Watertown's population stabilized at 36,500. Since 1961 there has been a reduction in manufacturing jobs. Many factories closed down or moved out of the area. Watertown Arsenal terminated many of its activities resulting in the further loss of jobs. Between 1960-1970, Watertown experienced a high rate of unemployment. In the 1970's and the early 1980's technology industries, public utilities and banks offer most of Watertown's stable employment opportunities. A new industrial area has developed west of Watertown Square, between Pleasant Street and the river. Changes in zoning laws permitted the construction of high-rise apartment buildings (Hodges 1989:189-190).

2.3 ARCHEOLOGICAL RESEARCH DIRECTIONS

2.3.1 Regional Concerns

Archeological data from the region in which the the Army Materials and Mechanics Research Center is located can contribute to a number of research questions about the history and prehistory of Massachusetts. Watertown lies within the Boston Area Study Unit, as defined by the Massachusetts Historical Commission in its State Plan entitled Cultural Resources in Massachusetts: A Model for Management. According to this report the Boston Area study unit is defined naturally by "a lowland depression of the Boston Basin" (MHC 1980:95).

Prehistoric Research Concerns. According to the Massachusetts State Plan, the prehistoric resources of the Boston Area study unit are "in the unique position of being among the best known in the state, while at the same time being the most fragmentary and disturbed by 300 years of intensive development" (MHC 1980:77). Specifically, Late Archaic period cultural remains are the most numerous prehistoric remains in the study unit, as well as in Watertown, in particular (MHC 1980:95). This fact is partly a result of the increased population density at this time. The preponderance of Late Archaic cultural remains in Watertown specifically may be due to the fact that Late Archaic populations intensively exploited estuarine resources; during this time period the vicinity of AMMRC was located at the Charles River estuary head. Questions relating to Late Archaic settlement-subsistence patterns, including prehistoric adaptations to estuarine environments, and to burial ceremonialism, can be investigated with data from Watertown and other portions of the Boston Area study unit.

Current interpretations about Late Archaic cultural systems in the AMMRC region and in the Boston Area study unit in general are based primarily on burial sites which predominate in the archeological record for that time period. Artifacts recovered from burials--a ritual/ceremonial context--may not reflect the total inventory of material culture of the society using the cemetery. A selective sample of artifacts occurs in graves. Late Archaic habitation sites, such as the Amphitheater site in Watertown, offer a more representative range of remains indicative of Late Archaic organization and behavior. Information about settlement and subsistence patterns, unavailable from burial sites or from artifacts removed from their original contexts, could be acquired from habitation sites.

The Late Archaic was a time of ecological change. The manner in which Late Archaic populations adapted to new environmental complexity is still unclear, although some general trends are recognized. The relationship between the different Late Archaic lithic traditions and therefore, of different Late Archaic human communities, is poorly understood. It is not known whether new technologies were added to existing ones or whether new populations brought their own tool assemblages with them from areas to the south. Although there are many artifacts from the Late Archaic period in Watertown, only habitation sites, such as the Amphitheater site, provide an undisturbed context for resolving some of the issues of the Late Archaic.

A second research issue concerns prehistoric adaptations to estuarine environments. A model of prehistoric settlement in estuarine environments has been proposed by Dincauze (1973). She argued that if the estuary head was the most advantageous area for catching anadromous fish, then as the estuary head changed location through time, so too would fishing site locations. Barber tested and revised this model using data from the Merrimack River estuary (Barfield and Barber 1982:15). He suggested that researchers distinguish between estuarine (that zone of the river which varies from salty to fresh over the tidal cycle) and tidal (that zone of the river which varies in volume as a result of the tidal cycle). Barber (Barfield and Barber 1982) argued that an estuary provides two foci for human subsistence practices. The upper estuary, falls, narrows and the mouths of tributary streams were utilized for trapping fish traveling upstream to spawn. The lower estuary was exploited for its rich shellfish beds and more permanent fish populations. As the head of the estuary moved inland so did both types of sites. The distribution of sites along the Charles River in Watertown especially around AMMRC could be an important data base for investigating changes in settlement pattern in an estuarine environment.

The Massachusetts State Plan and Dincauze (1968) point to research questions concerning human sociocultural interactions--transportation and communications networks, trade flows (MHC 1980:67). The regions around and in AMMRC include known sites of Late Archaic burial ceremonialism. Such ceremonialism has been explained variously as a mechanism for boundary-maintenance, as a social control mechanism, and as stress-alleviation. As discussed, population density and diversity increased in the Late Archaic, as did intensification of foraging strategies. Populations living in restricted territories must establish

and maintain exchange and interaction networks in order to obtain items unavailable locally or goods that became locally scarce as a result of short-term environmental perturbations. Burial cults most likely served social functions regarding interaction and exchange between and among social groups in the Late Archaic.

In order to operationalize this last research domain, priority must be given to investigations of the social environment (we must not limit ourselves to investigations of the physical environment), and to the social and symbolic uses to which material culture is put. Formal variation in material culture is nearly infinite, therefore we must develop models and strategies for the definition and recovery of data whose formal properties may carry significant social and cultural meanings (Dincauze 1980).

Historic Research Concerns. According to the Massachusetts State Plan, "historically the Boston Area (study unit) has served as the primary core of Massachusetts, and at least since the Archaic period, has been a primary center for cultural innovation and development" (MHC 1980:95). Therefore, Watertown, as part of the Boston Area study unit, can provide a context for the investigation of several issues raised in the State Plan (MHC 1980:67): (a) the historic patterns of diffusion, from centers of innovation, of material artifacts and ideas as indicators of changes in lifestyle; (b) the changing lifestyles practiced and resource exploitation techniques utilized by different groups in local environments; (c) the changing structures of spatial organization--transportation and communication networks, trade flows, hierarchies of urban centers--that have linked activities at different periods of time; (d) the succession of people who have lived in the state.

2.3.2 Installation-Specific Archeological Research Directions

Archeological investigations undertaken in the late nineteenth century identified one prehistoric site (believed to have been subsequently destroyed) on AMMRC property. There are, in addition, known sites in the immediate vicinity. This suggests that as-yet-unknown sites may be present. Any prehistoric sites which may be located at AMMRC in the future could provide useful data in addressing the research questions discussed in section 2.3.1. The Massachusetts Historical Commission has identified survey and evaluation of prehistoric sites in Watertown as a priority (MHC 1982:240).

Historic archeological remains dating from the period prior to government ownership can provide data relevant to the study of local history. In more specific terms, archeological remains from the nineteenth century house sites at AMMRC could both suggest, and provide solutions to, questions dealing with how the relationship between Watertown and Boston changed as the former has been increasingly drawn into the latter's sphere of influence. More specific research questions could probably be developed through additional documentary research into the history of the individual land parcels and their occupants, and after an initial evaluation of archeological deposits. The Massachusetts Historical Commission has not included archeological investigation of

nineteenth and early twentieth residential sites on its list of survey priorities (MHC 1982).

In addition, archeological remains associated with AMMRC's predecessor facility, the Watertown Arsenal, may be of significance. Such remains could provide information useful in addressing questions relating to ordnance technology, military construction techniques, lifestyles of military personnel from the early nineteenth through the twentieth centuries, as well as the history of the Arsenal. In the course of conducting research for this study, it became apparent that much of the historical documentary data relating to the Watertown Arsenal has been lost or destroyed. Archeological studies may be the only source of data about this installation which as one of a few pre-twentieth century arsenals, has played a significant role in American military history.

AN ASSESSMENT OF ARCHEOLOGICAL RESOURCE PRESERVATION AND SURVEY ADEQUACY

3.1 ENVIRONMENTAL CONSTRAINTS TO SITE PRESERVATION

Known prehistoric sites in the vicinity of AMMRC are confined to elevations between 30 and 50 ft. above sea level. These elevations would have been low terraces of the Charles River before it was dammed and prior to artificial filling in of its river banks. The sites are located either along the river banks or adjacent to tributary streams or ponds. There does appear to be a preference for occupation of sites at the upper end of the estuary; it follows that site location would shift in relation to the change in location of the head of the tidal zone (Barfield and Barber 1982:5-6) (section 2.3.1). Although most of these apparently preferred locations have been destroyed or modified in historic times, some intact areas do exist (see section 3.2).

3.2 HISTORIC AND RECENT LAND USE PATTERNS

AMMRC and the surrounding area have been the focus of a tremendous amount of construction, development, landscaping, and other earth moving operations, that continue up to the present day. Due to the large amount of ground disturbance in historic times, many features of the prehistoric environment are no longer visible. One of the major causes for the transformation of the landscape was the damming of the Charles River in 1908. The natural limits of the Charles River estuary were located near the original Watertown Arsenal complex prior to the damming (Dincauze 1968).

Construction of Watertown Arsenal began in 1816 (Dobbs 1977). At that time the Arsenal occupied 47 a. on a bluff overlooking the Charles River. It was originally established as a depot for the cleaning, repair, and issue of small arms and ordnance supplies (Hodges 1980:215). By 1830 this had been expanded to include the manufacture of field, siege, and seacoast guns and carriages. The architectural plans for the Watertown Arsenal were modelled after those of the Watervliet Arsenal at Gibbonsville (later West Troy, now Watervliet), New York. The Watertown Arsenal originally consisted of 13 brick buildings surrounding a parade ground. The first phase of construction was complete by 1820. Land purchased between 1816 and 1839 included several separate parcels. Approximately 3 a. were acquired from the Child family and the Jones family; a 1/4 a. was obtained from the Baxters and Baileys; and an additional 10 a. from Thomas Learned (Dobbs 1977:18). There is no readily available evidence indicating whether

or not houses were standing on these lots at the time of their purchase by the Army.

In April of 1964 the Watertown Arsenal was closed, but 12 buildings on 35 a. were retained for the use of AMMRC. The remaining Arsenal property was exccessed by the General Services Administration (GSA). The Town of Watertown bought 55 a. from GSA in August 1968. These 55 a. are now part of a recreation area (Watertown Arsenal Park) with a swimming pool, bath houses, baseball field, storage buildings, parking lots, and ball courts (Hodges 1980:216). Currently, a housing project for the elderly occupies the land just to the east of Talcott Avenue. A shopping mall is under construction on the remainder of the original Arsenal grounds.

The following summary evaluation of prior ground disturbance is limited to that portion of the original Watertown Arsenal property still occupied by, or under the control of, AMMRC. In reviewing the following section it must be remembered that while construction and subsequent demolition of structures during the historic period may have resulted in disturbance of prehistoric archeological sites, in some cases that same "disturbance" resulted in the creation of historic period sites.

The AMMRC site has been divided into 17 Ground Disturbance Areas (GDA's) to facilitate discussion (Figure 3-1). The information given here is summarized and supplemented in Table 3-1 which also provides primary and secondary references for the data.

GDA 1. Principal structures in this area are Buildings 37, 43 and 313, constructed in 1851 and 1862. Original construction drawings are not in AMMRC files (although they may exist elsewhere), and it is not possible to accurately evaluate the depth of disturbance associated with these structures. All three structures were expanded at later dates; information about these expansions is presented in Table 3-1. When the Arsenal was originally built, a large cistern was put in under the parade ground, and a second in the area of Buildings 71, 72, and 73 (which were located immediately east of the present AMMRC property line). All buildings were supplied with gutters which piped water to these cisterns. A cistern under Building 313 was connected to the other two by pipes; water was piped from them into four tanks installed in Building 313-N, and distributed to the various buildings by underground pipes. After the Arsenal was connected to the Watertown water system in 1889, the four tanks in Building 313 were supplied directly from a water main (Dobbs 1977:26).

"...in August, 1942, construction crews were excavating under Building 313 prior to sinking columns to support a second story addition. There they discovered the old cistern, which had long been forgotten. Six million gallons of water were pumped out of the well and further probing by the workmen revealed a network of ten rooms which were entered through an opening in the old Carriage office. The cistern was said to measure 26 feet by 70 feet, with a depth of 21 feet"(Dobbs 1977:26).

GDA-2. This area is presently a parking area. No evidence was located during the preparation of this report indicating that any structure ever

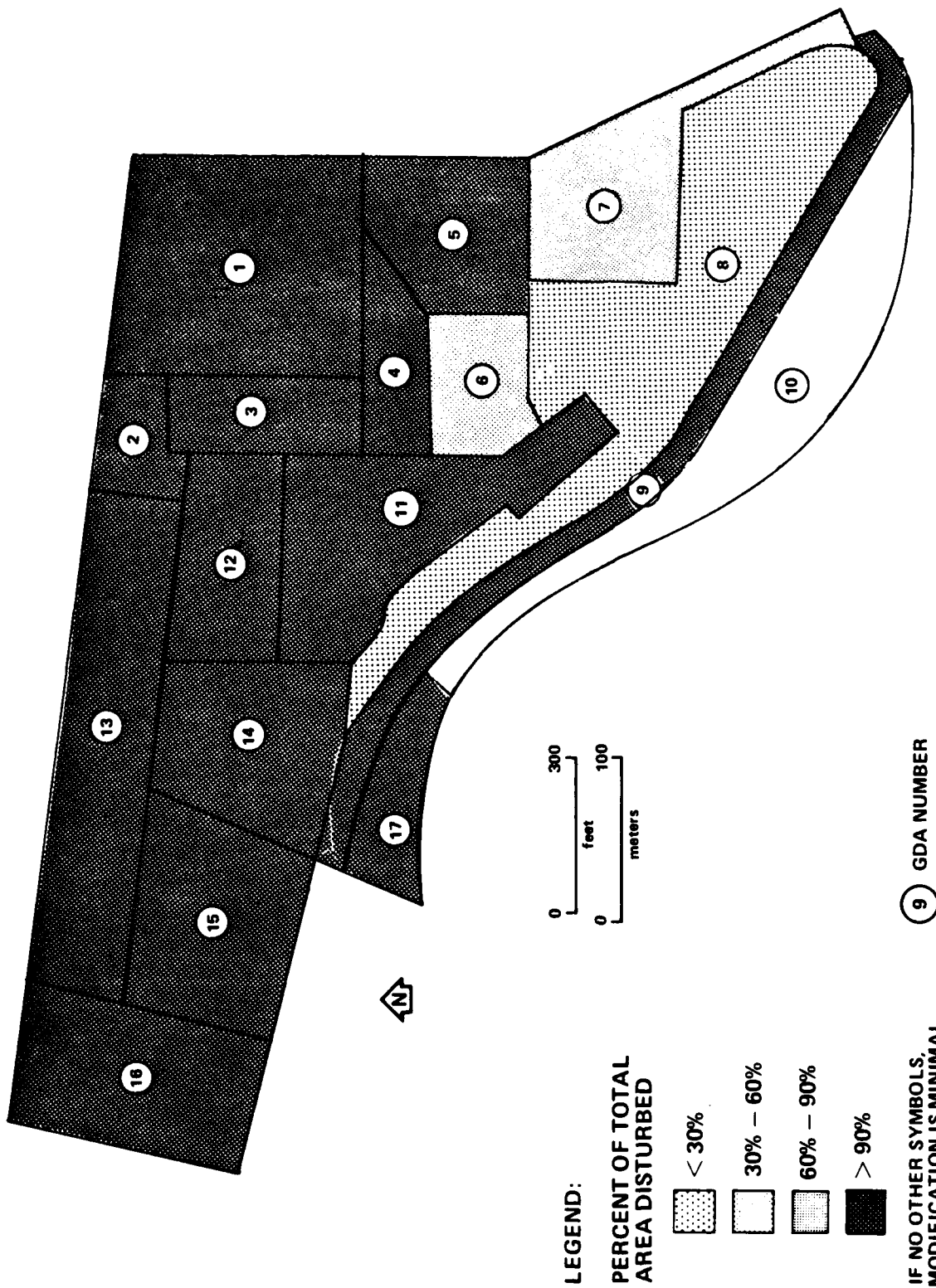


Figure 3-1 A MAP OF AREAS OF HISTORIC AND/OR MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE ON THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

GDA No	Type of Disturbance	Date Constructed (yr)	Reference ^a	Area Disturbed (acres)	Estimated Depth Below Surface (ft)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quad Sheet ^c	Coincidental Sites
							UTMB	Northing	Easting	Township	Range	Section
GDA-1	Construction of:											
	Bldg. 37	1851	Dobbs (1977: 19)	4.1		10:10	4682122	321675		Watertown	N770	Bldg. 922
	Bldg. 37 extension	1896										
	Bldg. 43	1862	Dobbs (1977: 25)		3.5							
	Bldg. 43 addition	1917	Dog. 5885									
GDA-2	Bldg. 313	1862	Dobbs (1977: 25)		6							
			Dog. AA-A-33560									
	underground utilities	var.	MPBIM Dog. 18-02-01		3-10							
	Construction of:											
	parking lot	?		0.7		10:10	4682180	321588		Watertown	N770	Bldg. 96
GDA-3	underground utilities	var.	MPBIM Dog. 18-02-01		3-10							
	Construction of:											
	Bldg. 312	1894	Dobbs (1977: 37)	1.3		10:10	4682117	71603		Watertown	N770	
	underground utilities	var.	MPBIM Dog. 18-02-01		3-10							
	Construction of:											
GDA-4	Bldg. 921	1917		0.8	?	10:10	4682039	321622		Watertown	N770	Bldg. 922, 921
	Bldg. 922	?			?							ANNEX-2, 3, 4, 6
	parking lot	1970	Dog. PE-2221 (3/70)		?							
	underground utilities	var.	MPBIM Dog. 18-02-01		3-10							
	demolition of Bldg. 921	1970	Dog. PE-2221 (3/70)		?							
GDA-5	demolition of Bldg. 922	1970	Dog. PE-2221 (3/70)		?							
	Construction of:											
	Bldg. 131;	1900	Dobbs (1977: 72)	2.1	?	10:10	4682004	321689		Watertown	N770	
	Bldg. 131 addition	1917	Dobbs (1977: 72)		?							
	Bldg. 131 addition	1943	Dog. AA-A-33571, 33564		5.5							
GDA-6	underground utilities	var.	MPBIM Dog. 18-02-01		3-10							
	Construction of:											
	Bldg. 118	1893		1.1		6:10	4681989	321617		Watertown	N770	ANNEX-5
	Bldg. 118 basement	1937	Dog. 24047		8.5							
	Bldg. 117	1906	Dobbs (1977: 40)		7.0							
GDA-7	Bldg. 117 basement	1938	Dog. 24413 (3/6/38)									
			Dog. AA-A-35649									
			(5/9/49)									
	underground utilities	var.	MPBIM Dog. 18-02-01		3-10							
	gardening	c.1918	Dog. 8855*		1							

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER (Cont'd)

GDA No	Type of Disturbance	Date Conducted (yr)	Reference ^a	Area Disturbed (acres)	Estimated Depth Below Surface (ft)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quad Sheet ^c	Coincidental Site ^d
							UTMB	Northing	Easting	Township	Range	Section
GDA-7	Construction of: Bldg. 111; underground utilities; tennis court; Associated landscaping	1865	Dobbs (1977: 27-30)	2.7	5	7:10	4681926	321702	Watertown			N770
		var.	MPBIM 18-02-01		3-10							
		1919	Dobbs (1977:46-48); Olmsted Archives File 6672A		2							
GDA-8	Construction of: railroad bed propellant storage area gardening	c 1918	Dog. 8855*	6.5	2	2:10	4681871	321651	Watertown			N770 Bldg. 913
		1966	AMMC Real Property Inventory		?							
		c.1918	Dog. 8855*		1							
GDA-9	Construction and widening of North Beacon St.; underground utilities	1824	Dobbs (1977:15)	3.6	2	10:10	4681902	321559	Watertown			N770
		1868										
		var.	MPBIM Dog. 18-02-01		3-10							
GDA-10	Construction of: small outfalls to Charles River recreation area	?	MPBIM Dog. 18-02-01 (Sheet 23)		?	?	4681822	321613	Watertown			N770
		?										
GDA-11	Construction of: Bldg. 60; Bldg. 60 extension; Coal Pocket; Oil Storage Tanks; underground utilities	1913	Dog. 9034 (2/5/12)	2.2	4.8	10:10	4682035	321554	Watertown			N770 Bldg. 45 AMMC-1
		1915	Dog. 4416 (8/21/15)		8.5							
		1921	Dog. X-536-MI (3/24/21)		13							
GDA-12	Construction of: Bldg. 36 Bldg. 36 extension; parking area Powder-Magazine Bldg. 45 Bldg. 45 extension; Demolition of Bldg. 45 underground utilities	1978	Dog. PE-2190 (6/78)		5							
		var.	Dogs. 5644 (4/13/17), MPBIM 18-02-01		3-14							
GDA-13	Construction of: Bldg. 36 Bldg. 36 extension; parking area Powder-Magazine Bldg. 45 Bldg. 45 extension; Demolition of Bldg. 45 underground utilities	1900	Dog. 5644 (4/13/17)	2.0	10	10:10	4682129	321526	Watertown			N770 Bldg. 216
		1917	Dogs. 5582, 5586, (4/13/17) QAA-32740 (11/27/44)		6-14							
		1970	Dog. PE-2221(3/70)		?							
GDA-14	Construction of: Bldg. 36 Bldg. 36 extension; parking area Powder-Magazine Bldg. 45 Bldg. 45 extension; Demolition of Bldg. 45 underground utilities	1817	Dobbs (1977: 10,12,77)		?							
		1915	Dobbs (1977: 45,77)		?							
		1918	Dobbs (1977: 45,77)		?							
GDA-15	Construction of: Bldg. 36 Bldg. 36 extension; parking area Powder-Magazine Bldg. 45 Bldg. 45 extension; Demolition of Bldg. 45 underground utilities	1970	Dog. PE 2221 (3/70)		?							
		var.	Dogs. 5644 (4/13/17), MPBIM 18-02-01		3-14							

Table 3-1. A SUMMARY OF HISTORIC AND MODERN GROUND DISTURBANCE THAT MIGHT LIMIT THE PRESENT ARCHEOLOGICAL RESOURCE BASE AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER (Cont'd)

GDA No	Type of Disturbance	Date Constructed (yr)	Reference ^a	Area Disturbed (acres)	Estimated Depth Below Surface (ft)	Ratio of Disturbed to Total Area	Location of Disturbed Area				USGS Quad Sheet ^c	Coincidental Sites ^d
							UTM	Northing	Easting	Township	Range	Section
GDA-13	Construction of: Bldg. 311	1917	Dobbs (1977:45) Dogs. 5605, 5606 (12/15/17)	4.4	1	10:10	4682197	321445	Watertown	N770	Simmons-1,2,3	
		1942	Dogs. 34207, 34222, 34225		1							
GDA-14	Construction of: Bldg. 97 Bldg. 292 Reactor Facility underground utilities Landscaping around reactor facility	1920	Dog. 10450 (1/26/20)	2.8	0-4	10:10	4682119	321440	Watertown	N770	Bldgs. 123, 145 214, 216	
		1920	Dog. No. 9735, 9736 (11/3/19)		0-4							
		1960	Dobbs (1977:61-62)		?							
		var.	Dog. PFO-1456 (6/6/60) MPBIM Dog. 18-02-01		3-9							
		1962	Dog. PFO-1456-A Dog. PFO-1768 (10/11/62)		1							
GDA-15	Construction of: Bldg. 39 underground utilities parking areas	1922	Dogs. CA-B-28419-20, PFO-1478	2.9	8-11	10:10	4682138	321350	Watertown	N770	Simmons-4	
		var.	MPBIM Dog. 18-02-01		3-10							
		?			?							
GDA-16	Construction of: Bldg. 243 Bldg. 246 parking areas Underground utilities	1960	AMRC - RPI	2.9	?	10:10	4682180	321277	Watertown	N770		
		1976	AMRC - RPI		?							
		?			?							
		Var.	MPBIM Dog. 18-02-01		3-10							
GDA-17	Construction of marina	/	Personal communication, 1.7 D. Diamond, AMRC	1.7	?	9:10	4682038	321394	Watertown	N770		

Note:

- Unless otherwise noted all drawings are on file with the AMRC Facilities Engineer. Drawing numbers unless otherwise noted refer to AMRC file numbers rather than the original drawing number. Drawing numbers followed by an asterisk (*) refer to original numbers of drawings in Record Group 150, Box 1, Entry 1409 at the National Archives; AMRC-RPI = AMRC Real Property Inventory. MPBIM = Master Plan Basic Information Maps
- UTM Zone 19.
- N770 = Newton 7.5', 1970 edition.
- Within the GDA

occupied GDA-2. The only presumed prior ground disturbance is that associated with paving the area and installation of underground utilities and rail lines (no longer extant).

GDA-3. The only documented disturbance (other than utilities and paving) within this area is that associated with the construction of Building 312.

GDA-4. Principal ground-disturbing activities in this area have been the result of the construction of Buildings 921 and 922, their subsequent demolition, and the conversion of the area for parking.

GDA-5. Disturbance within GDA-5 has primarily resulted from the construction and subsequent expansions of Building 131.

GDA-6. The western part of GDA-6 is presently occupied by Buildings 117 and 118, constructed as stables, and modified for use as military housing. The eastern part of the area is presently sodded. A 1918 map of the Arsenal indicates it was being used as a garden at that time.

GDA-7. This area includes Building 111 (the Commanding Officer's residence), the surrounding grounds and the drive leading to the southeast gate. Ground disturbance within GDA-7 was associated with construction of the building in 1865 and landscaping and grading in 1919.

GDA-8. This area contains no major structures. Ground disturbance has resulted from erection of several small utilitarian structures including pump houses and a propellant storage area. The northwestern portion of the area has been disturbed by construction of (and probably associated grading for) a rail line. The rail line, which served a coal pocket (subsequently converted to an oil storage area) in GDA-11 is shown on a 1919 site plan on file at the National Archives. A second rail line shown on the same map ran along the extreme southern edge of GDA-8. The roadbed for this line was apparently later used as a vehicle patrol road and is labeled as such on a 1958 Future Development map for the Arsenal (Dwg. PFO-672C-1). The north central portion of the area was used as garden for an unknown period of time.

GDA-9. This area constitutes the U.S. government easement to the Commonwealth of Massachusetts for North Beacon Street. In 1824 permission was given to the Commonwealth to construct a road through Arsenal property. The road was surveyed in 1824 and constructed by the Watertown Turnpike Corporation. In 1896 the Secretary of War authorized the Watertown Street Railway Company to construct a single track electric railway along the north side of North Beacon Street within the limits of the Watertown Arsenal. This street railway connected Watertown with the City of Boston until 1919 when the line was abandoned, the tracks removed and North Beacon Street repaved with granite blocks (Dobbs: 1977:38).

GDA 10. This area is part of the government easement to the Commonwealth of Massachusetts (Metropolitan Park Commission). An 1875 map (Beers 1875) of Watertown shows this area (and GDA-17) as marsh. However, an undated map showing Arsenal land purchases to 1839 (reproduced in Dobbs 1977:16) does not indicate this parcel as marsh or swamp. In addition land records indicate that it commanded the highest price per acre of the six original

parcels purchased for Watertown Arsenal in 1816 (Dobbs, 1977:65). The central portion of GDA-10 is presently occupied by playing fields and picnic areas. The extent of ground disturbance associated with their construction is unknown. However, detailed contour maps prepared in 1957 (Dwg. No. PFO-1114-32 and 1114-33) strongly suggest that this portion of GDA-10 has been elevated approximately four feet above the surrounding areas. The same maps show large circular depressions immediately east and west of the elevated area which may be borrow pits.

GDA-11. Construction of Building 45, Building 60 (the facility power house), and structure 295, originally a coal pocket, but later converted to oil storage, were the principal ground disturbing activities in this area. Building 45 was demolished in 1970 and its site converted into a parking area.

GDA 12. The construction of Building 36 was the major ground disturbing activity in this area.

GDA 13. This area is almost totally occupied by Building 311. The eastern half of the structure was built in 1917. The western half was added in 1942. The structure has no basement. The entire building rests on a concrete slab constructed on piers located around the perimeter. Several pre-Arsenal structures (see Section 4.2.1) were located on the site of Building 311 and were demolished in 1942.

GDA 14. This area is occupied by Buildings 97, 292 and the Horace Hardy Lester Reactor Facility. Ground disturbance in this area was primarily associated with their construction. Additional disturbance is presumed to have been associated with the construction and demolition of Buildings 123 and 214.

GDA 15. The principal structure in this area is Building 39, constructed in 1922 for the Vose and Sons Piano Company, and later purchased by the Simmons Mattress Company. A single pre-Arsenal structure was demolished along the east side of the area. The east and south portions of the area are now paved parking areas.

GDA 16. This area contained several residences and outbuildings when purchased by the government in 1941. These have all been demolished and the area is now a paved parking area.

GDA-17. This area is the eastern portion, south of North Beacon Street, of the easement to the Commonwealth of Massachusetts. A marina occupies the entire area. The extent of ground disturbance associated with its construction is unknown, but it is believed to be extensive.

In addition to the construction and demolition of structures, as well as the other activities described above, several other factors have contributed extensively to the disturbance of the AMMRC site. In 1897 a standard gauge railroad track was built connecting Watertown Arsenal's Building 312 with the Boston and Maine Railroad at Union Market Station across Arsenal Street. Subsequent trackage was added in later years. A 1919 plan of the Arsenal on file at the National Archives is believed to

show the maximum extent of the rail system at the Arsenal. Most of this trackage has been removed.

Numerous underground utility lines are located throughout the AMMRC site. These include water, gas, sewer, steam, oil and electrical lines, storm drains, and tunnels. The depth and extent of disturbance associated with these utilities varies enormously from area to area. In 1889 water mains and fire hydrants were installed at Watertown Arsenal. Additional mains and hydrants were added in 1917 and 1918. In 1917, a tunnel network was constructed connecting Building 60 with Buildings 45, 311 and 313.

With the exception of GDA's 8, 10, and 17 almost all of the AMMRC site not occupied by structures is paved.

3.3 PREVIOUS CULTURAL RESOURCE INVESTIGATIONS; COVERAGE AND INTENSITY

There have been no archeological investigations conducted within the present boundaries of AMMRC (Table 3-2). However, several studies have been made in the immediate vicinity, including three on what was formerly part of the Watertown Arsenal, immediately east of AMMRC.

Although no archeological studies have been conducted on AMMRC property, the Historic American Buildings Survey (HABS) of the National Park Service is presently completing an inventory and evaluation of standing structures at AMMRC (Table 3-3). Building 111 (Commanding Officers quarters) at AMMRC was listed on the National Register of Historic places on January 30, 1976.

3.4 SUMMARY ASSESSMENT OF DATA ADEQUACY, GAPS

Given the types and locations of prehistoric archeological cultural resources which have been recorded in the vicinity of AMMRC and given AMMRC's location on terraces of the Charles River, there is a strong likelihood that as yet unrecorded prehistoric archeological resources could be discovered at AMMRC.

It is likely that, for the historic period, most potentially remnant archeological resources at AMMRC have been identified. The available maps and historic records clearly delineate the former locations of nineteenth and twentieth century structures.

TABLE 3-3. ARCHEOLOGICALLY RELEVANT RESEARCH INVESTIGATION, EXCLUSIVE OF ARCHEOLOGICAL SURVEYS, CONDUCTED ON THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Study No.	Study Type	Study Date	Institution Agency, Firm	Principal Investigator	Bibliographic Reference	Location					USGS Quad Map	Associated Archeological Resources	
						UTM	Township	Legal					
								Northing	Easting	Range			Section
1	HABS Survey	1982	NPS/HABS	Libby Maylies Betsey Bahr	N/A			Entire Facility		N770*	See Table 4-4		

*N770 = Newton 7.5', 1970 edition.

4.0

KNOWN ARCHEOLOGICAL RESOURCES AT
THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

4.1 KNOWN ARCHEOLOGICAL RESOURCES AT AMMRC

At present, only one prehistoric archeological site is known to have been located at AMMRC or on property controlled by AMMRC. This Late Archaic site, designated 19MD373, is also known as the Powder Magazine site. It was identified by G.B. Frazer in the late nineteenth century (see section 1.3) (Tables 4.1, 4.2, and 4.3). The site is believed to have been largely destroyed by construction and subsequent demolition of Building 45 at AMMRC.

No known historic period archeological resources have been identified on AMMRC property.

4.2 POTENTIAL ARCHEOLOGICAL RESOURCES AT AMMRC

The presence of at least one known prehistoric site at AMMRC and the close proximity of several others (see section 1.3), together with AMMRC's location at what was formerly the estuary head of the Charles River, suggests that the Center's location would have been a preferred occupation site during prehistoric times. It is therefore possible that unrecorded aboriginal archeological sites may exist on undisturbed portions of AMMRC property.

The literative review conducted during the preparation of this report and inspection of documents currently on file with the AMMRC Facility Engineer have indicated that several potential historic period archeological sites may exist at AMMRC. These potential sites fall into two general categories: those associated with the pre-military historic period occupation of the site and those associated with activities of the Watertown Arsenal.

A list of potential archeological sites, at AMMRC is presented in Table 4-4.

4.2.1 Pre-Arsenal/AMMRC Sites

The plot plan for the 1942 extension of Building 311 (Dwg. No. CA-B-34207) shows nine structures in the extreme western portion of the

Table 4-1. PRESENTLY IDENTIFIED ARCHEOLOGICAL RESOURCES AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER; ADMINISTRATIVE DATA

Site Number	Site Recorder ^a	Date of Site Record	SIPO Survey Number	Site Record Repository ^a	Survey Collection Policy	Current Status of Investigation ^b		NRHP Status	State, Local Status ^c	Architectural Association	Bibliographic Reference
						REF, SCL, D	NA				
19MD373	MHC	1980	None	MHC	NA	REF, SCL, D	NA		MHCAS	None	

G.B. Frazer 1880-1910

Notes:

aMHC = Massachusetts Historical Commission.

bREF = site record filled, SCL = surface collected, D = vandalized or damaged without scientific control.

cMHCAS = Massachusetts Historical Commission Archeological Survey.

Table 4-2. PRESENTLY IDENTIFIED ARCHEOLOGICAL COMPONENTS AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER: DESCRIPTION AND EVALUATION

Site Number	Unit Age		Unit Description						Evaluation		
	Temporal Unit		Depositional Context			Dimension			Per-		
	Date		Features			Area			cent		
	DW ^a	YEARS EC/AD	Tradition (Period)	Phase	Landform	(m ²)	Depth (m)	Ascribed Function	tact	Value Integrit	CR ^d
19ND373	REL	100BC	Native American	Late Archaic	Terrace	NA	NA	?	0	NA	1 3

Notes:

aREL = Relative date based upon artifact attributes.

bPL = flaked lithics, GS = ground stone.

cRV = Research Value, 0 (no value) to 5 (highest value).

dCR = Confidence Rating: 1 = the judgement is more guess than science, and likely not to be reliable, 2 = the judgement is moderately reliable, 3 = the judgement is most likely reliable.

Table 4-3. PRESENTLY KNOWN ARTIFACT, ECOFACT, OR DOCUMENTARY COLLECTIONS FROM ARCHEOLOGICAL RESOURCES AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Site Number, Name	Collection Characteristics					
	Collection Location		Artifact	Ecofact	Documentary	
Curatorial Accession		Brief Description ^a	Size/No.	Brief Description	Size/No.	Size/No.
Repository	Number(s)					
194D373 Peabody (Powder Magazine Harward site)	84-3-10/33901-33915	FL, GS	250	NA	NA	NA

Notes:
sFL = flaked lithics, GS = ground stone

Table 4-4. POTENTIALLY IDENTIFIABLE BUT NOT PRESENTLY RECORDED
 ARCHEOLOGICAL RESOURCES AT THE ARMY MATERIALS AND
 MECHANICS RESEARCH CENTER

Site Number, Name ^a	Reference ^c	Description	Research Value CR ^b
Bird-1	Beers 1875 Dwg. No. 8855*	Site of pre-1875 residence	2
Bird-2	Beers 1875 Dwg. No. 8855*	Site of undated residence and/or nineteenth century outbuilding	1
Bird-3		Site of post-1875 residence	2
Lacker-1	Beers 1875	Site of pre-1875 residence	2
Lacker-2		Site of small outbuilding	1
Lacker-3		Site of large outbuilding (barn)	1
Lacker-4	Dwg. CA-B-34207; Photos WTN.921- 1113,1114	Site of nineteenth century residence	2
Quirk-1	Dwg. CA-B-34207; Photos WTN.921- 1115, 1116; Beers 1875	Site of post-1919(?) residence	2
Quirk-2		Site of outbuilding	1
AMMRC-1	Dobbs 1977:10,12,38	Site of 1817 magazine	3
Bldg. 214	Dobbs 1977: 17,18; Dwgs. F67635; 8855*;9836*	Site of 1842 wooden Greek Revival style laboratory razed in 1917	2
Bldg. 123	Dobbs 1977:26; Dwgs. F67635, 8855*;9836*	Site of pre-1862 double frame NCO quarters	3
Bldg. 45	Dobbs 1977:45,72; Dwgs. F67635; 8855*;9836*	Site Bldg. 45 (Press Shop) constructed in 1915, expanded in 1918 and demolished in 1970	3

Table 4-4. (Cont'd)

Site Number, Name ^a	Reference ^c	Description	Research Value CR ^b
Bldg. 216	Dobbs 1977:37 Dwg. No. 8855*	Site of winding shed constructed in 1886 and razed in 1924	3
Bldg. 922	Dobbs 1977:71 Dwgs. F67635, PFO-672C;8855*; 9836*	Site of foundry shed demolished in 1970	2
Bldg. 921	Dobbs 1977:46,72; Dwgs. PFP-672C; 8855*;9836*	Site of garage constructed 1917-1919 and demolished in 1970	1
Simmons-1	Dwgs. CA-B-28419; 8855*;9836*; Beers 1875	Site of house demolished in 1922	2
Simmons-2	Dwgs. CA-B-28419; 8855*;9836*	Site of store demolished in 1922	2
Simmons-3	Dwgs. CA-B-28419; 8855*;9836*; Beers 1875	Site of structure (barn) demolished in 1922	1
Simmons-4	Dwgs. CA-B-28419; 8855*;9836*	Site of house demolished in 1922	2
Bldg. 913	Dwgs. F67635; 8855*;9836*	Site of manure shed and pit	2
AMMRC-2	Dwgs. F67635, 536-MI;8855*;9836*	Site of tennis court and gas pumps and tanks	1
AMMRC-3	Dwgs. F67635; 8855*;9836*	Site of wagon shed	1
AMMRC-4	Dwgs. F67635; 8855*;9836*	Site of shed	1
AMMRC-5	Dwgs. F67635; 8855*;9836*	Site of two poultry sheds	1
AMMRC-6	Dwgs. F67635; 8855*;9836*	Site of oil storage	1

Table 4-4. (Cont'd)

Site Number, Name ^a	Reference ^c	Description	Research Value CR ^b
Bldg. 96	Dobbs 1977:72 Dwg. No. F67635	Track scales	2
Bldg. 145	Dwgs. No. PE2221 (16-06-13, Sheet 8); PFO-672C	Guard house	1

Notes: a. Designations assigned for this study

- b. Confidence Rating (CR): 1=resource has little research value or the information about it is unreliable, 2=resource may have research value and the information about it is probably reliable, 3=resource may have research value and the information about it is reliable.
- c. All drawing numbers, except those followed by asterisk (*), refer to AMMRC file numbers rather than original drawing numbers. * = original drawing number, drawing in possession of National Archives (Record Group 156, Entry 1409, Box 1)

AMMRC site. Three of the structures are located on a 0.5 a. parcel of land acquired by Watertown Arsenal from Mary F. Bird on 6 December 1941 (Dobbs 1977:65). The configurations of the structures as shown on the plot plan suggest that all three were residences. Structures corresponding to the locations of two of the three sites are also shown on an 1875 map of Watertown (Beers 1875:9) labeled "G.A. Sawyer". However, one is indicated as a wooden outbuilding. It is possible that the structure shown on the 1942 plot plan is a different structure erected on the same site.

Three additional structures are shown on the northern half of a 1 a. parcel purchased by the Arsenal from Caroline Lacker on 6 December 1941 (Dobbs 1977:65). One of these appears to have been a residence, one appears to have been a small (approximately 12 x 12 ft.) outbuilding, and one appears to have been a large (80 x 30 ft.) outbuilding, possibly a barn. The residence is also shown on the 1875 map of Watertown labeled "D. Condon".

The three structures on the Bird parcel and the three on the northern half of the Lacker parcel all carry the notation "Existing Bldgs Removed by Others" on the plot plan.

The seventh structure appears to have been a residence fronting on North Beacon Street in the extreme southwest corner of the AMMRC site on the southern half of the Lacker parcel. The two remaining structures appear to have been a residence (also fronting on North Beacon Street and also shown on the 1875 map, labeled "Mrs. A. Cushman") and an approximately 30 x 20 ft. outbuilding on a 0.5 a. parcel purchased by Watertown Arsenal from Edward S. Quirk on 6 December 1941 (Dobbs 1977:65).

The configurations of the two North Beacon Street houses match those of two structures shown in photographs in the files of the AMMRC Public Affairs Officer. Four photos (WTN.921-1113, 1114, 1115, 1116), all dated September 13, 1943, show the front and rear views of each structure.

On December 31, 1941, Watertown Arsenal purchased 5 a. of land from the Simmons Mattress Company. The parcel was bounded on the north by Arsenal Street, on the south by North Beacon Street, on the west by the Bird and Quirk tracts, and on the east by what was then the western boundary of the Arsenal. (This purchase apparently included the portion of School Street between Arsenal and North Beacon Streets. The closing of this section of School Street was necessitated by the extension of Building 311. What is presently called Welch Avenue within the AMMRC complex roughly corresponds with the southerly portion of the non-extant section of School Street).

Located on the Simmons parcel was a five story structure which was converted into a metallurgical laboratory (Building 39). This building had been constructed in 1922 by the Vose and Sons Piano Company. A grading plan for the structure (AMMRC Dwg. No. CA-B-28419; Densmore, LeClear and Robbins, Architects and Engineers Dwg. No. 822-71, dated July 18, 1923), shows the locations of four structures apparently demolished at the time the piano factory was constructed. Two are

labeled as houses, one is labeled as a store, and one is unlabeled. (The unlabeled structure, possibly a barn, is L-shaped and measures approximately 85 x 30 ft. with a 50 x 30 ft. wing). One house and the store carry the notation "Remove Foundations and Fill Cellars." The second house is labeled "To Be Removed." The northern house and the possible barn are shown on the 1875 map of Watertown labeled "G. Bleiler".

Below-grade remains of some or all of these non-Arsenal related structures may still exist on AMMRC property. An evaluation of their significance is given in Section 5.1.

4.2.2 Arsenal/AMMRC Related Sites

In 1842, a one-story wooden laboratory (labeled Building 214 on a 1919 map of Watertown Arsenal) was erected near what was then the southwest corner of the Watertown Arsenal site. "Probably the only use of a full-blown Greek Revival idiom at the Arsenal, this building was later used for storage purposes and razed in 1917" (Dobbs 1977:18). The structure is shown in an 1862 sketch and an undated photograph, both reproduced in Dobbs (1977: Figures 17 and 24). Neither indicates whether the structure had a basement but the photo clearly indicates that the front porch was constructed on brick piers.

Building 123, no longer extant, was the West Non-Commissioned Officers Quarters. The structure was constructed at an unknown date prior to 1862 (it is barely visible in the 1862 sketch of the Arsenal reproduced in Dobbs). It was demolished sometime after 1917 (it is schematically shown on a 1918 engineering drawing, F67635, labeled "West Cottage").

In 1817 an 80 x 32 ft. stone magazine was constructed at Watertown Arsenal. The site has been designated AMMRC-1 for this study. Building 45, the Press Shop, was constructed in 1915 incorporating the original magazine. It was expanded in 1917. The entire complex, located immediately south of extant Building 36, was demolished in 1970. The site is presently a paved parking area.

A one-story, wooden winding shed was constructed c. 1886 west of the present location of Building 312. It was razed in 1924 (Dobbs 1977:37). The site has been designated Building 216 - its designation on a 1919 map of the Arsenal.

Building 922, a foundry shed in excess of 300 ft. long was erected immediately south of extant Building 37 (formerly a foundry). It was demolished in 1970.

Building 921, a garage, was constructed between 1917 and 1919 (Dobbs 1977:46) adjacent to Building 922, in what is now a paved parking area. The structure was demolished in 1970.

Building 913 is a "manure pit" and/or "manure shed" shown on 1918 and 1919 maps of Watertown Arsenal. It was demolished or destroyed at an unknown date.

Five additional potential archeological sites at AMMRC have been identified on maps of the Watertown Arsenal dated to 1918 and 1919. The

sites, designated here as AMMRC-2 - AMMRC-6 are labeled "tennis court," "shed," "wagon shed," "oil storage," and "poultry" (2).

The approximate locations of all of the known and potential sites are shown on Figures A-1 and A-2, and described in Table A-1. An evaluation of their potential archeological significance is presented in Section 5.1.

AN ASSESSMENT OF THE SIGNIFICANCE OF THE ARCHEOLOGICAL
RESOURCE BASE AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

5.1 THE SIGNIFICANT RESOURCE BASE

Aside from 19MD373, which is not believed to be extant, there are no known prehistoric archeological resources located on AMMRC property. However, unrecorded prehistoric occupation sites may be present. Any prehistoric sites located at AMMRC in the future will have to be evaluated in terms of their potential to contribute information important to the study of prehistory, as well as in terms of their physical integrity.

There are no known historic period archeological resources at AMMRC. However, the former locations of numerous buildings and structures have been identified during this study (Table 4-4). Whether or not any of these potential sites has any significant archeological manifestation is unknown.

The degree of prior ground disturbance at the AMMRC site (Table 3-1) is difficult to assess. The nature and depth of disturbance is extremely idiosyncratic, varying from one small area to the next. As a result, the archeological significance of any potential site is directly related to its physical integrity. For purposes of the following assessment of significance, it is assumed that intact archeological remains associated with each site possess at least some degree of physical integrity.

5.1.1 Pre-Arsenal/AMMRC Sites

Of the eight possible sites of former non-military residences on AMMRC property, at least five definitely date to the nineteenth century or earlier. (Four are shown on the 1875 Beers maps of Watertown; the fifth, not shown on the map, can be stylistically dated from photos on file with the AMMRC Public Affairs Office). All of the three remaining structures presumably post-date 1875. One was demolished in 1922 and occupation of the last two ended in 1941 although the actual date of demolition has not been determined. Nothing is presently known about the store located on the Simmons tract. All of these sites together with associated outbuildings and features (wells, privies, etc.) have the potential for providing information about lifestyles of Watertown area residents in the nineteenth and early twentieth centuries.

There is nothing presently known about any of these sites to suggest that they are in any way unique or even atypical. It is likely

that similar sites may be quite common in the Watertown area. In fact, many structures that would have been contemporary with and similar in function to those that existed at AMMRC are still extant in the vicinity. In the absence of additional data, it seems probable that the pre-Arsenal historic archeological sites at AMMRC (if they have not been disturbed) will, at best, be of only local significance. More detailed evaluation in terms of National Register of Historic Places criteria cannot be made at this time.

5.1.2 Arsenal/AMMRC Related Sites

1817 Magazine. The site of this structure (which was later incorporated into Building 45, and presumably demolished along with the latter) may contain remains of the only Watertown Arsenal structure dating to the Arsenal's founding, still on AMMRC property and under government control. The magazine is described as having been "of an oblong form-80 feet by 32-with a range of pillars in the center supporting Groin arches of 12 feet space, with two doors at one end and two windows at the other" (Capt. G. Talcott, quoted in Dobbs 1977:10). It was intimately related to the original military use of the AMMRC site and should intact below-ground remains exist, they may, by virtue of their historical association and/or what they might reveal about early activities at the Arsenal, be significant. The site has been designated AMMRC-1 for the present study.

Building 214. This Greek Revival structure was the first laboratory erected at the Watertown Arsenal and as such may be considered to be the direct forerunner of AMMRC. However, given the fact that the building was used only for storage for an unknown period prior to its demolition in 1917, it is unlikely that archeological materials associated with its original function are present. In addition, a photo of the structure, and the fact that its construction cost was only \$920 (by comparison, the 1817 magazine cost \$25,000) both suggest that it was constructed at or above grade. Below-ground remains, other than perhaps some footings, are therefore unlikely to be present. It is unlikely that there are significant structural remains associated with the laboratory.

Building 216. This structure, known as the winding shed, was constructed in 1886 and razed in 1924. It was a one-story wooden building where the wire-wrapping process was carried out. The Cozier 10-inch breech-loading wire-wrapped gun (manufactured between 1890 and 1894) was made in the winding shed. The wire-wrapping method was superseded by the autofrettage or cold-working process in 1921. The winding shed is thus associated with important developments in ordnance manufacture. In addition, the site is also associated with a prominent individual, Major General William Cozier. Cozier designed the gun named for him while a lieutenant stationed at Watertown. He was also responsible for designing numerous other guns made at the Arsenal. He was eventually appointed US Chief of Ordnance. Archeological remains associated with the wire-wrapping process and the winding shed, if extant, would probably be significant in terms of National Register criteria.

Building 123. This structure is described by Dobbs (1977:26) as a double frame non-commissioned officers quarters. No information as to its date

of construction is available but it must have pre-dated 1862 since it is shown, although barely visible, in a birds-eye view of Watertown Arsenal made in that year. It is also shown on a 1917 map of gas lines at the Arsenal (Dwg. F57635) labeled "West Cottage." Its date of demolition is unknown. Archeological remains of Building 123 could provide information about its actual date of construction and design. Such remains could also provide information relevant to the study of the lifestyles of enlisted military personnel during the nineteenth century. If remains of Building 123 are present, they would probably be significant in terms of National Register criteria.

Building 45. This structure, the Press Shop, was "constructed in 1915 and in it was installed a 200 ton press. The one-story brick and steel building was built so that the original magazine formed an ell into it, and heat-treating furnaces for armor piercing shot and for gun forgings were installed in it. In 1918 the size of the building was increased 98 feet in length to house heat treating furnaces" (Dobbs 1977:45). Building 45 was demolished in 1970. AMMRC files contain no drawings of the structure. However, its size and configuration are shown on a 1956 master allocation plan for Watertown Arsenal (Dwg. No. PFO-672C). Since additional information about Building 45 may have been archived, the extent of existing documentation on the Press Shop is unknown. Activities carried out in Building 45 were an important part of the total operation of Watertown Arsenal. Archeological remains associated with those activities and the structure itself could therefore be potentially eligible for the National Register.

Building 922. Dobbs (1977) contains no information relating to this structure, suggesting that it never played an important part in activities carried out at the Watertown Arsenal. It is labeled "Foundry Shed" on the 1918 map showing gas lines at the Arsenal and was demolished in 1970. It seems likely that the structure served maintenance activities associated with the foundry formerly located in Building 37 immediately to the north. It is unlikely that substantial below ground remains associated with Building 922 ever existed. If any are extant it seems unlikely they could contribute any form of significant data.

Building 921. This structure was a garage constructed sometime between 1917 and 1919 (Dobbs 1977:46, 72). Measuring approximately 100 x 150 ft. it was demolished in 1970. As far as can be determined no significant events or activities were associated with Building 921. While below ground remains of the structure may exist, it is probable that the only information they could provide would relate to materials and methods of construction. Such data are not likely to be significant and may, in any case, be available from archived documents.

AMMRC-2 - 6 These potential sites are all shown on an unscaled schematic drawing, dated April 3, 1981, of the gas distribution system at Watertown Arsenal. The scale of the drawing is estimated at 1 in. = 100 ft. and it is felt to be fairly accurate in its location of structures based upon an analysis of the depiction of structures which are still extant.

AMMRC-2 was the site of a tennis court, measuring approximately 40 x 85 ft., located in the area between Buildings 131 and 37 which is now a

parking area. At some time after 1918, gas pumps and storage tanks were erected on the same location. These were removed in 1970. Remains of the tennis court could provide data relating to the construction of such facilities during the early twentieth century. Such data are, however, unlikely to be considered historically significant. In addition, given the amount of disturbance at this location, it is unlikely that remains of the tennis court exist. Remains of the gas pumps and tanks could not be considered significant.

AMMRC-3 - AMMRC-6 are all sites of former structures shown on the 1918 gas lines map and the 1919 Arsenal map. They include a "wagon shed," "shed", two "poultry" (sheds?), and a structure used for "oil storage." The labels on these structures suggest they were utilitarian in nature and of not very substantial construction. It is unlikely that below-ground remains of any of these sites exist. If they do, they are unlikely to be significant.

Building 913. This was the site of a manure shed and/or pit south or southeast of Building 117. It is shown on the 1918 map of gas lines at the arsenal ("manure pit" due south of Building 117), the 1919 map of the Arsenal southeast of Bldg. 117, and a 1921 location plan (Dwg. 536 - MI) for the coal pocket (now structure 295) ("manure shed" southeast of Building 117). The discrepancy in the site's location may indicate that two separate sites existed, but the short time period between the two drawings makes this unlikely. Building 118, the Watertown Arsenal stables, were erected in 1851 and the manure pit may have been constructed and used any time between that date and 1937 when the stable (Bldg. 118) and cow barn (Bldg. 117) were converted to officer's quarters. It is possible that the manure pit was used for disposal of other forms of refuse, and therefore may contain artifactual material from the mid-nineteenth to mid-twentieth centuries. Such materials could provide significant data about life at Watertown Arsenal during that period.

Building 96. The site was the location of a set of track scales constructed in 1920 at the same time as the Watertown Arsenal locomotive house (Building 97). It was located at the northern edge of the Arsenal, midway between buildings 43 and 311. The scales were removed or razed sometime prior to 1956 (the tracks leading to them are not shown on the 1956 Master Allocation Plan, Dwg. PFO-672C). Remains of the scales, if present, could be significant in that they may be able to contribute to an understanding of the activities carried out at the Arsenal. In the absence of extant primary documentation about the scales, archeology may be the only way to gather data about a structure which may have been uniquely designed to meet the specialized and in many ways unique requirements of the Arsenal.

Building 145. This was the site of a guard house erected sometime between 1942 (it is not shown on a plot plan of the western portion of the Watertown Arsenal dating from that year) and 1956 (it is shown on the 1956 Master Allocation Plan). It was demolished in 1970. It was located northeast of the intersection of Welch Ave (formerly School Street) and North Beacon Street. Remains of the structure are unlikely to be of any significance.

The information presented above is summarized in Table 5-1.

5.2 IDEAL GOALS AND OBJECTIVES

Given the total absence of known, significant archeological resources on AMMRC property, a discussion of how to best study and manage resources which might be identified in the future would be premature. However, given the number of potential archeological sites, the obvious first objective of future archeological work at AMMRC should be that of determining if below-ground physical remains associated with potentially significant sites are extant. This would involve subsurface testing to locate prehistoric as well as potentially significant historic sites and is discussed in greater detail in Section 6.

Archeological investigation of the remains of structures and sites associated with the development and operation of Watertown Arsenal should be given special attention since such sites are unique.

Table 5-1. SUMMARY OF SIGNIFICANT ARCHEOLOGICAL RESOURCES AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Temporal Unit	Thematic Unit	Resource Type	Type Occurrence			Socio-cultural Asn.	Landform Asn.	Physical Integrity	Research Value ^a	RV CR ^b	Socio-cultural Value ^c	
			Known Occurrences (no.)	Potential Occurrences (no.)	Other Likely Occurrences						RV CR ^b	SCV CR ^b
Prehistory	Native American Subsistence and Settlement	NA	1	0	+	Native American	NA	?	1	3	1	1
		Foundry Shed	0	1	-	American	NA	?	3	2	1	2
19th Century	Military Manufacturing Buildings	Laboratory	0	1	-	American	NA	?	3	2	1	2
		Press Shop	0	1	-	American	NA	?	3	2	1	2
		Winding Shed	0	1	-	American	NA	?	3	2	1	2
		Magazine	0	1	-	American	NA	?	3	2	1	2
		Garage	0	1	-	American	NA	?	3	2	1	2
5-6	Military Utilitarian Buildings	Munition shed and pit	0	1	-	American	NA	?	3	2	1	2
		Oil storage site	0	1	-	American	NA	?	0	1	0	1
		Gas pumps and tanks	0	1	-	American	NA	?	0	1	0	1
		Wagon shed	0	1	-	American	NA	?	0	1	0	1
		General purpose shed	0	1	-	American	NA	?	0	1	0	1
		Track scales	0	1	-	American	NA	?	3	2	1	2
		Guard House	0	1	-	American	NA	?	0	1	0	1

Table 5-1. SUMMARY OF SIGNIFICANT ARCHEOLOGICAL RESOURCES AT THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

Temporal Unit	Thematic Unit	Resource Type	Type Occurrence			Landform Assn.	Physical Integrity	Research Value ^a	RV CR ^b	Socio-cultural Value ^c	SCV CR ^b
			Known Occurrences (no.)	Potential Occurrences (no.)	Other Likely Occurrences						
19th Century	Military Residential and Support	MCO quarters	0	1	-	American	?	3	2	1	2
		Tennis court	0	1	-	American	?	0	1	0	1
		Poultry sheds	0	1	-	American	?	0	1	0	1
	Pre-Arsenal Residential	Houses and Associated Outbuildings	0	10	-	American	?	2	1	1	1
		Barn	0	2	-	American	?	1	1	1	1
	Pre-Arsenal Subistence Related Structures	Store	0	1	-	American	?	2	1	1	1

a. This is a subjective summary assessment of the overall research value (RV) of the resource class. It is an evaluation of the class' quality of preservation, representation of activity diversity or uniqueness, and temporal distinctiveness or reflection of diachronic relationships. It incorporates the need to avoid triviality, but to acquire what may be redundant data so as to discern patterns among those data. Based on these research values, the resource class under discussion is ranked from 0 (no value) to 5 (highest value), including "NA" if such an evaluation is believed to be impossible given the available information.

b. The Confidence Rating (CR) is a further evaluation of the perceived reliability of the research (RV) or sociocultural (SCV) values of the resource class. The following code records a judgement of that reliability, based on the available information: (1) the judgement is more guess than science, and likely not to be reliable; (2) the judgement is moderately reliable; (3) the judgement is most likely reliable.

c. This is a subjective summary assessment of the overall sociocultural value (SCV) of the resource class. It is an evaluation of the social, religious, or political importance of the resource to a contemporary community, from 0 (no value) to 5 (highest value).

6.0

A RECOMMENDED ARCHEOLOGICAL MANAGEMENT PLAN
FOR THE ARMY MATERIALS AND MECHANICS RESEARCH CENTER

6.1 FACILITY MASTER PLANS

AMMRC, as of June 1983 when data gathering for this study was concluded, had no definite future plan for any construction involving ground disturbance. All future construction will consist of internal modifications to existing structures (S. Gilfix, 1983 personal communication). However, it is possible that sometime in the future (c. 1986) an emergency generator will be installed at AMMRC. Whether this will be a permanent fixture, necessitating construction of an approximately 20 x 10 ft. concrete support slab, or a truck mounted portable generator has not yet been determined. [Subsequent to completion of the draft version of this report a decision was made to erect a new structure in the area south of Building 36. This is believed to have been the location of archeological site 19MD373. However, that site is believed to have been destroyed by the construction and subsequent demolition of Building 45 (See Table 3-1)].

6.2 APPROPRIATE ARCHEOLOGICAL MANAGEMENT GOALS WITHIN THE ARMY
MATERIALS AND MECHANICS RESEARCH CENTER'S MASTER PLAN

6.2.1 General Facility Planning

Almost all of the property under the jurisdiction of AMMRC has been disturbed to some degree. However, it is possible that small discrete areas of relatively intact original ground surfaces do exist. Some or all of the potentially significant sites listed in Table 4.4 (those with a CR value greater than 1) may be located in such areas. Fortunately, the locations of most of these potential sites (Figure A-1, Table A-1) are believed to be fairly accurate. For this reason it is recommended that any future below ground disturbance (including new structures, utility lines, grading, and/or landscaping) avoid these sites if at all possible. Should engineering or other considerations require disturbance of these locations, archeological evaluations including sub-surface testing should be carried out as part of the design phase of the project. A separate archeological survey to locate and evaluate these sites is, however, not recommended independent of such projects. Should intact remains of any of the potentially significant sites exist, they are currently protected; either because they are under pavement or in areas not likely to be otherwise disturbed.

Because of the relatively high density of prehistoric archeological sites in the immediate vicinity of AMMRC, it is possible that such sites do exist in undisturbed portions of AMMRC property. However, as noted above, most such areas will be small and their locations almost impossible to predict. Exceptions to this are GDA areas 8 and 10 (Figure 3-1). Although the former has been criss-crossed with numerous underground utility lines, most of the area is sodded or in light forest and current grade in most areas appears to approximate original ground surface. Non-wooded portions of GDA-8 are presently being used for gardening and recreational purposes. An archeological survey of this area designed specifically to determine if any potentially significant prehistoric sites are present is recommended.

GDA-10 (together with GDA-9 and GDA-17) currently constitutes a right-of-way grant to the Commonwealth of Massachusetts (Metropolitan Park Commission). The majority of this area has been developed for recreational uses, including ball fields and picnic areas. As noted in Section 3.2, a 1875 map of Watertown shows this area as marsh, suggesting it is actually composed of fill. In addition, detailed contour maps of the area suggest that changes in grade have also been made. It is recommended that Commonwealth and Commission records be checked to determine if there is any record of filling and/or other land modifying activities in this area. If such records are not available, a program of sub-surface testing should be carried out in this area to determine if any original ground surfaces exist. If such a survey were to produce positive results, an archeological survey should be carried out. In the event that archeological sites are located, AMMRC should modify the existing easement agreement to require the Commission to protect any and all such sites by restricting access to them, and prohibiting any activities which might adversely effect them.

6.2.2 Project-Specific Resource Protection or Treatment Options

No project-specific resource protection or treatment options are recommended at this time.

6.2.3 A Summary of Recommended Management Directions and Priorities for Effective Compliance and Program Development

The following prioritized archeological resource management tasks and policies should be implemented by AMMRC:

- o Avoid any below ground disturbance to areas where potential sites are believed to be located; until such time as their existence has been confirmed and/or their significance established.
- o Conduct a detailed review of records relating to the AMMRC portion of the Watertown Arsenal which are not in the possession of AMMRC;
- o Conduct an archeological survey of GDA-8 (Figure 3-1);
- o Conduct a study of land formation and modification in GDA-10, including on-site testing if necessary

- o Modify existing easement agreement with the Commonwealth of Massachusetts to provide for protection of archeological resources which might be present.

Additional recommendations are dependent upon the results of the studies suggested above.

6.3 ESTIMATED SCOPES-OF-WORK AND COST LEVELS FOR PRESENTLY IDENTIFIABLE MANAGEMENT NEEDS

6.3.1 Supplemental Records Review

This task has two basic components: an inventory of all records pertaining to the portion of the original Watertown Arsenal now occupied by AMMRC and an analysis of all archived documents pertaining to the potentially significant archeological sites identified in this study. The primary source consulted should be the National Archives regional records center in Waltham, Massachusetts. It is believed that at least some documentation pertaining to non-extant structures at AMMRC has been deposited there. The New England Division of the Corps of Engineers, also in Waltham, was responsible for much of the construction at Watertown Arsenal and may have relevant documents on file. Finally Record Group 77 (Records of the Office of the Chief of Engineers) of the holdings of the Cartographic and Architectural Branch of the National Archives should be consulted. (Portions of Record Group 156, Records of the Office of the Chief of Ordinance, were examined for pertinent data as part of this study). The purpose of this task is to obtain detailed information relating to the history of use and construction of the non-extant structures at AMMRC which would assist in an evaluation of their significance. The estimated cost of this supplemental records review is \$2500.

6.3.2 Archeological Survey of GDA-8.

Given the existing ground cover, this task should consist of sub-surface testing throughout the eastern and southern portions of GDA-8. (The area northwest of Building 652 has been disturbed by railroad/road bed construction and underground utilities). Its purpose is to determine if any previously unrecorded prehistoric archeological resources are present. Sub-surface investigations should consist of a line of shovel tests placed at 50 ft. intervals along the top of the bluff north of North Beacon Street. A second line of shovel tests should be excavated along a line 50 ft. north of and parallel to the first. Succeeding parallel lines of tests should be continued until an examination of soil profiles indicates that original ground surfaces have been destroyed, or until the northern boundary of GDA-8 has been reached. All excavated material should be screened through 1/4 in. hardware cloth, and any artifactual material recovered should be retained for analysis. Upon completion of field work, a detailed report describing the results of the testing program should be prepared and a copy submitted to the State Historic Preservation Office (for informational purposes if results are negative and for comments regarding the potential significance of identified sites and recommendations regarding the need for additional work if results are positive). It is

estimated that field investigations should require six person-days; analysis and report preparation should require an additional two person-days. The estimated cost of this work is \$1600-2000.

6.3.3 Analysis of GDA-10

As noted in Section 3, there is some evidence indicating that some or all of GDA-10 was formerly marsh land which was filled. The purpose of this study is to determine whether or not this is correct and, if not, to evaluate the degree of ground disturbance associated with construction of the existing recreation area.

The initial phase of this study should be a review of construction documents for both North Beacon Street and the recreation area if these can be located. (The Massachusetts Department of Transportation, the Watertown Highway Department, and the Metropolitan Park Commission should be contacted). Should data from these sources not prove adequate, soil borings within GDA-10 should be made. The number and depth of these borings will depend upon initial findings. These borings should allow an evaluation to be made of the nature and extent of any fill present and the likelihood that prehistoric resources may exist.

If the results of the evaluation are positive, the Department of the Army should advise the Commonwealth of Massachusetts of the need to revise the existing easement agreement to ensure that any future ground disturbing activities conducted or permitted by the Commonwealth are subject to review under Section 106 of the National Historic Preservation Act.

An estimated total cost for the analysis of GDA-10 can not be made at this time since it will depend upon checks of the availability of existing documentary data. The cost of documentary studies is estimated at \$1000-\$1500.

A review of all major information sources likely to have data relating to the archeology of the site occupied by the Army Materials and Mechanics Research Center was conducted for this study. That review indicated that numerous prehistoric sites have been reported in the immediate vicinity of AMMRC, and that one prehistoric site is known to have existed is on AMMRC property. Twenty-eight potential historic period archeological sites were identified from a review of nineteenth and twentieth century maps and plans of the Watertown Arsenal, AMMRC's predecessor installation. These can be classified either as pre-arsenal residences and associated outbuildings (all located west of Welch Avenue) or as the sites of structures associated with Arsenal operations. The latter include the site of a magazine constructed in 1817, the site of a winding shed where the wire-wrapping of guns took place, the site of a nineteenth century laboratory structure, the site of a nineteenth century warrant officer's residence, and the sites of numerous utilitarian and support type structures like sheds. The physical integrity of all of the potential sites is unknown. Only a portion of these potential sites is believed to possess sufficient significance, assuming below ground physical remains are intact, to be potentially eligible for the National Register of Historic Places.

Among the institutions consulted as part of the basic data gathering were: the Peabody Museum and the Institute for Conservation Archaeology, both of Harvard University, the Massachusetts Historical Commission (State Historic Preservation Officer), the University of Massachusetts (Amherst) Library, the Bronson Museum (Massachusetts Archaeological Society), the Newton Historical Society, the Watertown Main Library, the American Museum of Natural History, the Museum of the American Indian-Heye Foundation, the New York Public Library (Map Division), and the Navy and Old Army, Still Photo, and Modern Military History branches of the National Archives. In addition, the "America: History and Life" data base of Lockheed's Dialog Information Retrieval Services, which contains abstracts from more than 2000 history journals, was also consulted.

Two separate visits to AMMRC were made by the authors. In addition to a general walkover of the facility, including a portion of the easement to the Metropolitan Park Commission south of North Beacon Street, photos and construction plans and drawings maintained by the

Facilities Engineering Division were examined. Photographs in the files of the Public Affairs Officer were also checked.

Although there appears to have been extensive disturbance of most of AMMRC, much of it is very difficult to define because original construction documents for non-extant buildings and abandoned tunnels are no longer in the possession of AMMRC. These documents may or may not exist at another location. For the same reason it is also impossible to evaluate, at this time, the potential extent or even existence of below ground remains associated with non-extant structures. Therefore all ground-disturbing activities in the vicinity of all potential sites identified in this study should be avoided if at all possible.

An archeological survey of the wooded and sodded areas in the southeast section of the facility is recommended. In addition, an evaluation of the potential for the presence of prehistoric resources within the portion of AMMRC property presently included within the easement to the Commonwealth of Massachusetts should be undertaken, and terms of the easement modified if necessary.

8.0
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